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# MILITARY PIPE LINES

## The First Detailed Account of How These Portable Pipe Line Systems Are Constructed and Operated

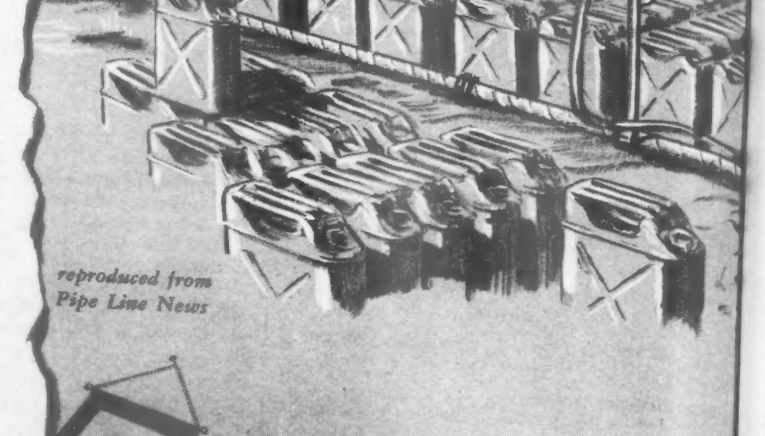
gas.

The small size pumping unit has a Gaso duplex piston pump, 4¼-inch bore by 6-inch stroke, driven by V-belt. This unit has a capacity of 200 barrels per hour, or 140 gallons per minute at 90 revolutions per minute and operates at a differential pressure of 200 pounds per square inch. The fluid end can withstand pressures up to 750 pounds.

The pump is powered by a six-cylinder Buda gasoline engine, rated at 96-h.p., under continuous load. This is about double the power required to operate the pump under normal load. Gasoline for the engine normally comes from the pipe line if gasoline is being pumped, by means of a double valve line from the top of the sand trap to a 45-gallon supply tank located under the engine hood, and from there to the engine by gravity flow. For either types of service, the engine is equipped with an electric fuel pump so that a gasoline supply can be taken from can, drum or underground storage where required.

The larger size of Gaso reciprocating pump also used has a 4-inch bore by 10-inch stroke, with capacity of 200-barrels per hour at 70-r.p.m., powered by a large Buda engine.

**Centrifugal Pumps Used**



*reproduced from Pipe Line News*


*here's where...*

**...Your GASO pumps are serving!**

While realizing the inconvenience imposed upon you by our war commitments, both we and our men hope that you will find some satisfaction in the knowledge that the GASO PUMPS that would normally be serving you are helping instead to speed the return of your loved ones in the armed forces . . . Gaso Pump & Burner Mfg. Co., 902 East First Street, Tulsa, Oklahoma. Export Office: 149 Broadway, New York. Shreveport: W. L. Somner Co., 419 Lake Street. Los Angeles: Service Oil Field Supply Co., 5333 S. Riverside Drive.

**GASO PUMPS**

FOR EVERY OIL INDUSTRY NEED

the OIL AND GAS JOURNAL

# Trends

**Crude-Oil Production By States—Page 136**

**CRUDE-OIL STOCKS** 234,188,000 bbl. as of April 15—up 16,000 bbl. One year ago 241,421,000 bbl.

**GASOLINE STOCKS** 88,778,000 bbl. as of April 15—up 678,000*. One year ago 92,075,000 bbl.

**RESIDUAL FUEL-OIL STOCKS** 51,238,000 bbl. as of April 15—up 166,000. One year ago 67,011,000 bbl.

**GAS OIL AND DISTILLATE STOCKS** 30,561,000 as of April 15—up 83,000. One year ago 30,806,000 bbl.

**CRUDE-OIL PRODUCTION** 4,425,400 bbl. daily average week ended April 22—down 12,220 bbl. Year ago 3,921,920 bbl.

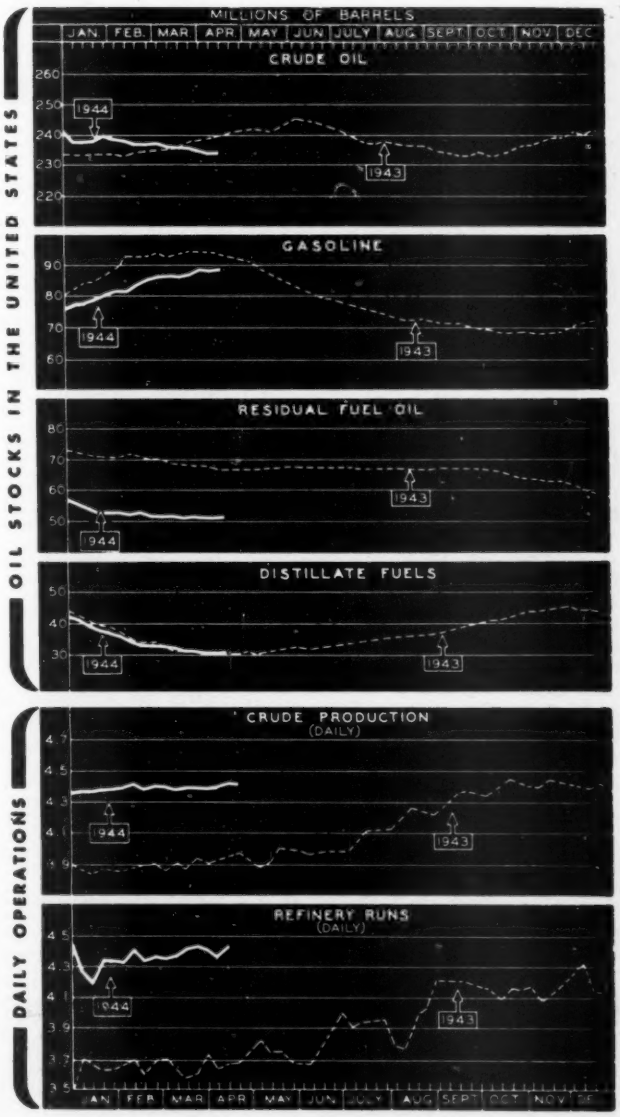
**REFINERY RUNS** 4,447,000 bbl. daily week ended April 15—up 93,000 bbl.

*Stocks week ended 4-8-44 revised.

CONCERN is being expressed by many refiners regarding the policies of the Office of Price Administration in applying selective advances in crude-oil price schedules. The basis for misgiving is reflected in a statement issued in connection with five scattered advances which became effective Tuesday, April 25, in oil fields located in four states. In this instance, as in many others that preceded it, OPA officials explained that the price increases in crude oil would be absorbed by purchasers with no adjustments in the prices for products refined from the crudes. Approximately 80 adjustments have been made by OPA in crude-oil price schedules. "While opposing a general price increase in crude oil," the OPA release stated, "increases are granted where it is shown that hardship is being suffered under the existing ceiling, that a higher ceiling will stimulate production, or to bring a field's ceiling up to the level of prices being obtained in surrounding areas for the comparable quality of crude."

REFINERS generally have no objections to adjustments in crude-oil prices where it is apparent that schedules are below those of other comparable areas. But they object to "holding the sack" where the changes are based on objectives which have nothing to do with the refinery value of the crude oil. In most instances so far the advances have applied to small fields and to situations where the crude oils are purchased by large refinery organizations. These large refiners can absorb the advances without seriously affecting plant returns. It is pointed out that the position of the smaller plants is different in that an advance of a few cents a barrel applying to part of their crude-oil supply would end profitable operation for the entire refining operation unless compensating adjustments are made in product prices.

THE possible application of these OPA pricing policies in connection with plans to grant subsidies in stripper-well operations is being discussed by refiners. It is understood that the details of this subsidy plan will be announced in the near future. Under this program refiners are reimbursed for additional payments made to producers. It is known that certain government officials in the past have insisted that part of the subsidy payments should be absorbed by the Government and part by refiners in cases where it was contended that the refinery operating margins are excessive.



# International Oil Compact Believed Slated For Consideration at Resources Conference

*by Henry D. Ralph*

WASHINGTON. — Behind closed doors in the ancient State Department Building, the officially designated petroleum experts of the British and United States governments have begun consideration of postwar plans for development of and access to the world's petroleum resources.

Whatever progress may have been made to date is not known, but it is understood the American delegation's proposals follow rather closely the recommendations made several months ago by the foreign operating committee of Petroleum Administration for War, which included a suggestion for an international oil compact similar to the U. S. Interstate Oil Compact Commission. Another element of the American proposals is believed to be insistence that the British abandon their cartel system under which marketing territories in various parts of the world are staked off as the spheres of operation of particular companies.

All that the State Department would say officially was that the preliminary exploratory discussions "are progressing satisfactorily in their initial stage," adding:

"The discussions are proceeding on the basis of the recognition that ample petroleum supplies available in international trade are necessary for the security and prosperity of nations; that for the foreseeable future the petroleum resources of the world are adequate to assure ample supplies for increasing postwar markets; and that expanding world demand must be met by the orderly flow of oil from the various producing countries of the world."

### Three of Group Experts

A concession has been made to the complaint that the State Department's industry advisory committee was nothing more than window dressing because of the Justice Department's attitude that oil-industry men would be violating the antitrust laws by participating in discussions leading up to any international agreement. The department has announced that 3 of the 10 members of the advisory group have been invited to sit in on the day-to-day discussions as expert consultants, while the other 7 will remain on call. The three are John A. Brown, president of Socony-Vacuum Oil Co., Inc.; W. S. S. Rodgers, newly elected chairman of The Texas Co., and A. Jacobsen, president of Amerada Petroleum Corp.

The controversial Arabian pipe-line project of Petroleum Reserves Corp. probably will be discussed only incidentally, if at all, by the Anglo-American conferees, since they are dealing primarily with principles and policies for general and world-wide postwar application. According to informed sources the contract draft submitted by PRC has been rejected by the three companies which are considering constructing the pipe line, and a new draft has been submitted by Standard of California and Texas. Gulf Oil Corp. is said to have raised so many points of objection

## Statement of Senate Committee

THE committee does not conceive its initial duty to be to enter upon a detailed collection of statistics on petroleum resources. It is not intended to engage in studies of a factual nature which for practical purposes would duplicate work already completed by other committees of the Senate, agencies of the executive department and various branches of private industry.

This is a policy committee. Its essential function is to make recommendations for the formulation of a national policy in which particularly in its international aspects, the Senate of the United States has a direct responsibility.

Petroleum has emerged in this war as a natural resource of the highest strategic significance. After the war its use and conservation may be expected to play a dominant role in the maintenance of peace and security among nations and in promoting prosperity among peoples.

These are propositions readily accepted. The more difficult questions relate to methods by which this nation and other nations are to govern the impact of petroleum upon a world moving out of war and into peace.

The United States is by far the leading nation in producing and consuming petroleum products. The policy it adopts towards the production and distribution of this great natural resource, and its derivatives, is bound to have a profound influence not only upon the domestic economy of the country, but also upon the course we, as a nation, are to pursue in foreign affairs.

Congressional participation in the formulation of this policy is essential, if the policy is to be truly national and an authoritative pronouncement which the people of the country will be prepared to accept and implement.

With the organization of this committee, congressional participation in the formulation of a national petroleum policy has begun. Other departments of the Government have already indicated a readiness to keep the committee fully advised on developments and to assist the committee in its studies and investigations.

It is recognized, in line with Secretary Hull's recent declaration, that the Congress is to be given adequate participation in charting the country's course in foreign affairs. To the extent that the determination of a national petroleum policy may involve understandings, arrangements or agreements with other countries, with possible influence on the broad principles of foreign policy, the committee has been assured that the Congress will be fully consulted in advance of final commitments.

In a matter so grave and far reaching in its effect upon the national economy and upon the country's postwar position in world affairs, the Congress has a duty to do more than merely to formalize by legislation a policy previously determined by others. It is for this reason that the committee has undertaken a comprehensive study of the petroleum situation both at home and abroad.

Thus, the work of the committee, even in advance of formal recommendations to the Senate, should aid in bringing to the Congress valuable information upon preliminary deliberations affecting a national petroleum policy.

It is recognized that in the utilization of petroleum products for the immediate purposes of waging war, our military services must act quickly and must adopt temporary measures which cannot await the determination of a long-range plan—or policy.

Neither the Senate as a whole, nor this committee, has any intention to interfere with this exclusive responsibility of the Army and Navy. It is always proper, however, to consider whether measures taken for military purposes might also affect the long-range policy on petroleum.

It is the committee's view that the representatives of private industry in petroleum should be asked to join with the Government in the work leading to the formulation of a petroleum policy. We initiate these studies with no preconceived ideas on the restriction of private capital in fields of legitimate enterprise. We believe that on this tremendous postwar problem the country needs the candid and open-minded cooperation of Government and industry working together in the interest of national welfare and security.

It may well be that the principles agreed upon in the formulation of a national petroleum policy, and the technique adopted for integrating the work of Government and industry in this field, will create a pattern for solving the problems related to other natural resources.

that the other two companies drew their own plan which is now being studied by PRC officials.

F. A. Davies, president of Arabian-American Oil Co. (jointly owned by Texas and California Standard), appeared last week at an executive session of the Senate petroleum resources committee, presumably to describe the company's interest in the pipe line. While there has been no public promise that the contract to construct the Arabian pipe line would not be concluded until the Senate committee completes its investigation, there appears to be little disposition to rush it through at the moment.

The Senate committee has announced that it expects to begin public hearings about May 1, and that there will be a constant exchange of information between the committee and the State Department regarding matters affecting national foreign oil policy. In a statement issued by Chairman Francis Maloney of Connecticut, the committee declared that representatives of the petroleum industry should be asked to join with the Government in the work leading to the formulation of a petroleum policy.

# Arabian Line Sound Venture, Texas Company Head Asserts

NEW YORK. — The Arabian pipeline question is of such great national importance that it should be settled, not by the oil industry, but "by those in authority who are entirely neutral and have only the welfare of the American people at heart," declares W. S. S. Rodgers, newly elected chairman of the board of The Texas Co., in his first public statement on the controversy, given out Tuesday of this week. The proposed pipe line is now the subject of an Anglo-American conference in Washington, and Rodgers is one of three leading oil men serving as advisers to the United States representatives in the discussions.

"In my opinion," says Rodgers, "this question transcends not only the interests of the companies involved, but also those who feel their interests might be adversely affected. Furthermore, I feel very strongly that the decision should not be unduly influenced by publicity emanating from interested companies."

Summarizing The Texas Co.'s position, Rodgers says: "We believe that the proposed pipe line is sound economically and should be built. Second, it does not constitute entry of the Government into the oil business. Third, our oil reserves in Saudi Arabia may be regarded as an insurance policy if in the future there is a shortage of petroleum in this hemisphere, as predicted by numerous authorities in the Government and industry. Fourth, the Government's action is justified because the proposed pipe line traverses several mandated countries, and international relations are involved. Finally, the action is justified from the viewpoint of diplomatic relations; first, in the Government's encouragement of American business abroad, and, second, competition with foreign oil companies (one of which is controlled by the British Government through a majority stock ownership), strongly backed by the British Government."

Commenting on these points, Rodgers says: "We feel quite strongly that there cannot be much doubt that the construction of this proposed pipe line is economically sound and fully justified. Most of the criticism is aimed at our second point, that for the Government to own this line is in effect putting the Government into the oil business. We do not think so, because Arabian American Oil Co. (owned 50-50 by The Texas Co. and Standard Oil Co. of California) and Gulf Exploration Co., through a subsidiary pipe-line company, will build the line and operate it. We submit that the mere fact the Government holds title does not in itself constitute doing an oil business. The Government will not have any voice in the management of Arabian American Oil Co. or in its development of this concession. Furthermore, it will own none of the capital stock, either of Arabian American Oil Co. or the proposed pipe-line subsidiary, and will not be represented on the boards of directors of either of these companies.

"Practically all of the experts in the oil industry qualified on the subject of petroleum reserves willingly concede that the Middle East is one of the most important oil areas in the world today. Moreover, it is very important from the viewpoint of our country and its citizens, as well as to the future of our oil industry, and perfectly fitting and proper for our country to take action along the lines contemplated . . . in order to assure the United States and its people an adequate supply of American produced oil for future use to supplement that which is to be produced in this hemisphere.

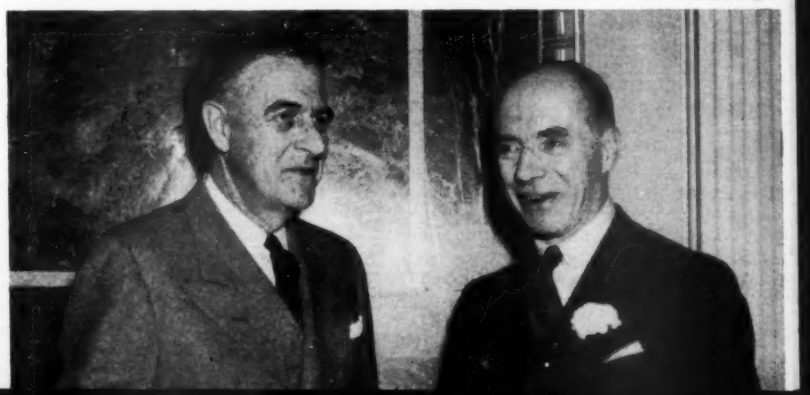
"The proposed line will traverse the countries of Saudi Arabia, Trans-Jordan, and Palestine. In acquiring the necessary rights-of-way, international mandates and other international relations are involved. It would seem requisite, therefore, that our federal Government should be a party to the proposed undertaking in order to assist in acquiring these rights-of-way."

Rodgers says that one of Texaco's principal competitors in the Middle East is controlled by the British Government, and that if the federal Government does not take an active interest in this area, "recent events foreshadow the fact that Saudi Arabia is more than likely to come into the zone of British influence." If this should happen, he said, the Arabian American company would be subjected to the rules and regulations of the sterling bloc, and its operations would thereby be substantially hampered.

Rodgers discloses that the area under consideration covers some 616,000 sq. miles — about one-fifth the area of the United States, with oil reserves totaling possibly 10 billion barrels. He says that the idea of the pipe line originated with the Government, but that final definitive contracts are subject to the approval of companies involved.

***Charles Rayner, petroleum adviser, Department of State, and Sir William Brown are cochairmen of the meeting between American and British oil experts, at which various questions regarding petroleum resources will be discussed***

Harris & Ewing



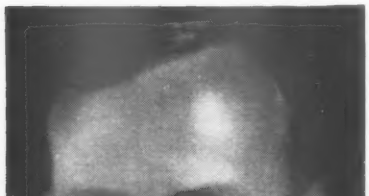
# Rodgers and Klein Advanced By The Texas Company

NEW YORK.—W. S. S. Rodgers, president of The Texas Co. since 1933, was elected chairman of the board of directors at a director's meeting which followed the company's annual stockholders' meeting held here April 26. Rodgers remains as chief executive officer of the company. Harry T. Klein, executive vice president and general counsel, was elected president of the company. R. L. Saunders was elected vice president and O. J. Dorwin general counsel.

Both Rodgers and Klein have been associated with The Texas Co. for many years. Rodgers was graduated from Sheffield Scientific School, Yale University, in 1907, and entered the service of The Texas Co. in November 1915. During World War I, he served as captain in the U. S. Army. Returning to the company, he held various executive positions.

Colonel Klein was born in Bellevue, Ky., and from 1907 to 1917 he practiced and taught law in Cincinnati. In August 1917, he was sent to France as a first lieutenant of infantry. Later he was promoted to lieutenant colonel. He is an officer of the French Legion of Honor and was awarded the American Distinguished Service Medal. He entered the service of The Texas Co. in 1921.

*W. S. S. RODGERS*



*H. T. KLEIN*

## Gallagher Favors World Oil Compact

NEW YORK.—An international oil-conservation agreement with the United States taking the initiative in collaboration with other oil-producing nations was recommended Tuesday by R. W. Gallagher, president of Standard Oil Co. (New Jersey) in his letter to stockholders transmitting the company's annual report.

"If, after this war, any substantial part of the world is to enjoy a standard of living approaching that achieved in the United States, world production of oil must be greatly increased," Gallagher wrote. "There are, we think, two principal problems. One is to find more oil, the other is to establish sound, world-wide conservation policies under law so that oil will not be taken from the ground wastefully."

Declaring that governments have not been successful in finding new resources, but when competing with private companies have actually prevented discovery of new resources, he asserted that "the U. S. Government should encourage American private enterprise, first by refraining from competition, and second by lending American enterprise diplomatic support where Americans are at a disadvantage in foreign countries by reason of foreign laws or practices."

# Bowles Replies to Zook's Charges

WASHINGTON.—On the eve of Senate committee hearings on petroleum prices in connection with continuation of the Office of Price Administration and its stabilization powers, Administrator Chester Bowles has made public a general denial of charges that OPA has treated the oil industry unfairly in the matter of price ceilings.

Bowles answered a letter sent to President Roosevelt by Ralph T. Zook, president of the Independent Petroleum Association of America, in which Zook charged the OPA had violated the constitution in setting oil-price ceilings too low and in passing on and denying petitions for redress.

The Senate committee on banking and currency was scheduled this week to hear I.P.A.A. spokesmen and others on crude oil prices in the course of its consideration of a bill to extend the price stabilization law beyond its expiration date of June 30.

Bowles' letter to Zook undertook to show that the price of crude oil is not subnormal, that it has not restrained drilling, and that OPA's policies and methods are not unfair.

After replying directly to several points in Zook's letter to the president, in which paragraphs he "indicated the errors which exist either in the statement itself or in the conclusions drawn therefrom," Bowles concluded:

"I wish to make it clear that this office is mindful of the constitutional limitations imposed upon either legislative or administrative action under the Bill of Rights. So long as this agency provides price ceilings which make it possible for the industry to operate on a more profitable basis than that on which it has operated in peace time, and so long as we permit, as we always have, the industry to file either formal protests and petitions or informal requests for price increases, I am unable to understand the line of reasoning which leads to the conclusion that property has been taken for public use without compensation and that industry has been deprived of its right to petition.

"It is my belief that the oil industry, in all departments, has fared unusually well under price control. Available figures not only indicate the greatest profitable crude-oil production in the history of the oil business (with only one-tenth of 1 per cent reduction in estimated reserves) but also show that the refining and marketing segments of the industry have steadily improved their profit position."

# THIS WEEK

**PRODUCTION**—May production quota, 4,818,500 bbl. daily, registers new high. . . . Tops April quota 93,500 bbl. . . . Over two-thirds of increase is assigned southwestern states. . . . Of 71,000 bbl. additional certified to that district Texas gets 60,000. . . . ¶Pure again has well of the week in Tri-State region (three in succession). . . . Latest is in Clay City Consolidated pool, Wayne County, Illinois. . . . Official IP 1,223 bbl. daily. . . . ¶Swifter development of new West Moore field, Oklahoma, indicated. . . .

**INTERNATIONAL**—W. S. S. Rodgers, chairman Texas Co., says Arabian pipe-line project sound. . . . Question should be settled, "not by oil industry, but by those in authority, neutral, with welfare of people at heart." . . . ¶Rodgers one of three leading oil men named advisers at Anglo-American petroleum conference. . . . Absence of active men had stirred sharp criticism. . . . Others are John A. Brown, Socony-Vacuum, and A. Jacobsen, Amerada. . . . ¶Anglo-American discussions "progressing satisfactorily."

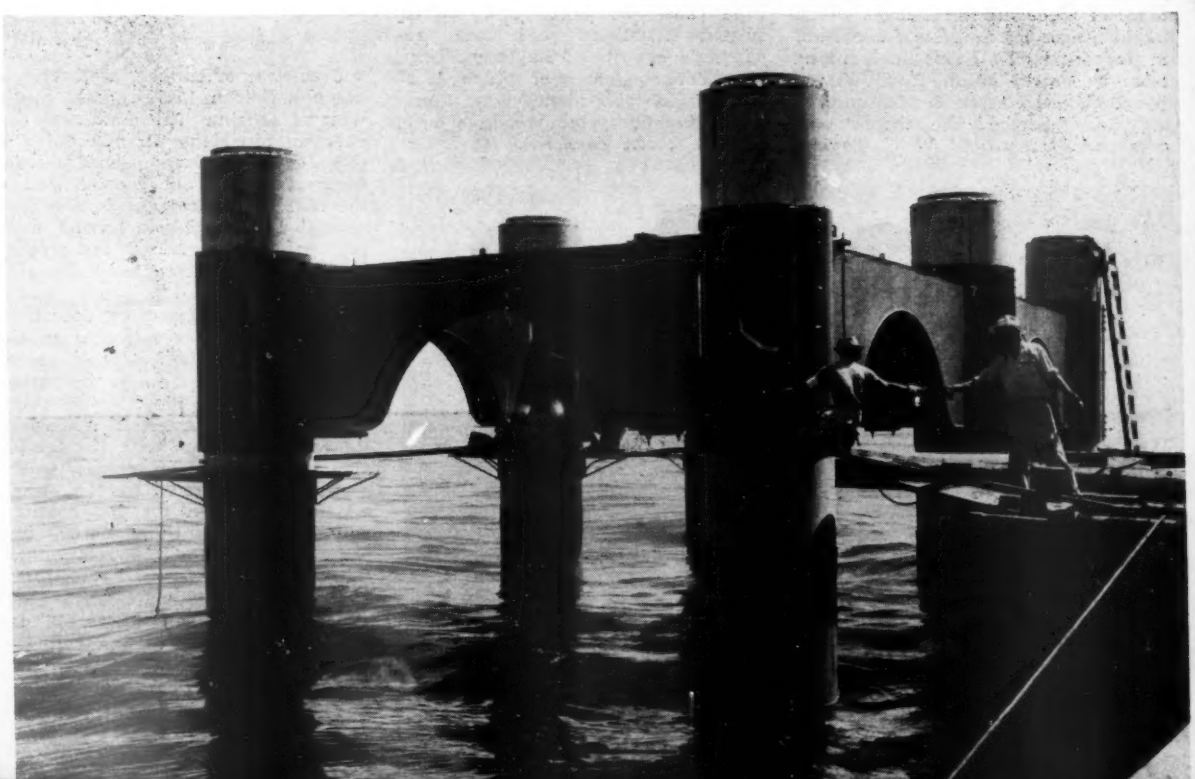
**PRICES**—Advances of 5 to 10 cents in crude prices effective in five fields April 25. . . . Makes total of 80 selective increases authorized by OPA, which continues firm in opposition to general price advance. . . . ¶Details of subsidy program for stripper wells expected in few days. . . .

**LEGISLATION**—Voorhis introduces bill in House setting up three-pronged government program to spur oil production. . . . Federal loans, subsidies, guaranteed profits main features. . . . Would exclude companies engaged in three or more of these functions: producing, refining, transporting, marketing. . . . ¶Senate appropriations committee accepts Navy bill rider providing for return of 532 acres near Moore, Okla., to former owners. . . . Navy had condemned the land to build airfield. . . . Paid $46,431 for it and $150,000 for facilities. . . . Oil may be worth $4,000,000. . . .

**BLACK MARKET**—Almost 1,000 major violators of gasoline rationing arrested since January 1. . . . Score: Convictions, 464; to jail, 86; sentenced to more than a year, 38; others awaiting trial. . . . ¶Gasoline obtained by "thieves, counterfeiters, who steal, print, sell coupons" would increase ration for A motorist 30 miles a month, Shad Polier, director rationing enforcement, tells House subcommittee probing malodorous mess. . . . "Best brains of underworld pitted against Government. . . . ¶But Representative Hartley declares OPA using black market as smoke screen for "its own bungling." . . .

**DRILLING**—Gulf appropriates $4,680,000 for drilling campaign in Laurel area, Mississippi. . . . Plans call for at least 24 tests in Eucutta field, 54 in Heidelberg. . . . ¶Million-dollar drilling program, 20 to 25 wells in Sheridan County, Kansas, announced by Continental. . . . Its discovery there swabbed 50 bbl. hourly for 9 hours. . . . Major field seen. . . . ¶Sinclair launching "greatly expanded" program, including Mississippi, Michigan, Ohio, and Kentucky wildcats. . . . Has 76 locations drilling or rigged up. . . . ¶Creole Petroleum to step up drilling operations in Venezuela. . . . Predicts large-scale exploration.

*Twin wells will be drilled from this completed derrick foundation for Creole Petroleum Corp. in Lake Maracaibo, Venezuela. All operators in Venezuela have undertaken an intensive drilling program, as it is anticipated that demands for Venezuelan oil in 1944 may exceed the potential capacity of the fields now in production*



# Johns Named President of Scouts And Landmen's Association

DALLAS.—H. Layton Johns, Freeport Sulphur Co., New Orleans, was elected president of the National Oil Scouts & Landmen's Association at its 20th annual convention here April 24 and 25. Johns, who for the past year has been editor-in-chief, succeeds Dell J. Crosby, Humble Oil & Refining Co., Houston, who automatically becomes chairman of the board of directors.

Other officers elected were: Troy Stalls, Stanolind Oil Purchasing Co., Midland, Tex., first vice president, succeeding S. S. Stinson, Humble Oil & Refining Co., Midland; H. T. Robinson, Phillips Petroleum Co., Evansville, Ind., second vice president, succeeding E. V. S. Lowerre, The Pure Oil Co., Oklahoma City; J. S. Smith, The Pure Oil Co., Wichita, Kan., secretary-treasurer, succeeding Wesley Weed, Sun Oil Co., Alice, Tex., and Howard Brooks, Magnolia Petroleum Co., Dallas, editor-in-chief.

The meeting was attended by more than 150 scouts, landmen and visitors. The program, although streamlined, included a discussion by Sidney Lee, Atlantic Refining Co., on the "A-B-C of Aviation Gasoline," and a paper by Dr. Frederic H. Lahee, Sun Oil Co., on "Exploratory Drilling in 1943." Freeport Sulphur Co., New Orleans, presented a moving picture on "Sulphur Mining." Another picture, 'Victory's Oil," was shown under the auspices of Cities Service Oil Co., Bartlesville, Okla.

The association in a special ceremony paid tribute to members in the armed forces of the country.

# P.I.E.A. Considers Technical Advances

DALLAS.—The effect of recent research on future operations was stressed at the annual conference of Petroleum Industry Electrical Association and Petroleum Electric Supply Association here, April 19-20.

Morris Chambers, Standard Oil Co. of Louisiana, emphasized the importance of preparing for changes which might utilize possibilities of television in the control of all pipe-line stations from a central point. R. T. Fryer, Westinghouse Electric & Manufacturing Co., described the theory and operation of rectifiers. W. G. Taylor, General Electric Co., mentioned the amplidyne, a new development not in the electronic field, which may have application for voltage regulation. A surprise came when R. W. Perkinpine, American Telephone & Telegraph Co., at the close of "Communication Circuits for the Big-Inch Pipe Line" had the public-address system connected with the dispatcher's circuits of Baytown, Tex.-New York system over which A. N. Horne, vice president, War Emergency Pipelines, Inc., made a brief address to the delegates.

*Officers of Petroleum Industry Electrical Association: J. F. Collerain, Houston Pipe Line Co., secretary-treasurer; M. C. Callahan, Gulf Refining Co., Tulsa pipe line division, vice president and general chairman of 1945 convention committee; R. C. Appling, United Gas Pipe Line Co., incoming president; F. W. Littell, Shell Pipe Line Corp., outgoing president*

# Intensive Drilling Is Projected in Venezuela

NEW YORK. — Demands for Venezuelan oil in 1944 that "may exceed the potential capacity of the fields now in production" are predicted as a possibility in the annual report of Creole Petroleum Corp., affiliate of Standard Oil Co. (New Jersey) and largest operator is Venezuela. Accordingly all of the principal operators have undertaken an intensive drilling program. Petroleum Administration for War has approved the accelerated programs and has given its assurances that it will assist in the procurement of needed material in the United States.

Resumption of large-scale exploration activity is also contemplated, the report states. This activity, greatly curtailed since the beginning of 1942, will include drilling of wildcat wells "in an effort to discover new fields with which to augment the known reserves and bring them more in balance with the expected high rate of withdrawal."

Venezuelan production in 1943 averaged 491,505 bbl. per day, an increase of 21 per cent over 1942. Despite the emphasis on eastern Venezuela, the bulk of the production continued to come from the Lake Maracaibo area. Maracaibo and Cumarebo production averaged 396,904 bbl. per day, 81 per cent of the country's total. Daily average production figures by export districts follow: Maracaibo, 392,136 bbl.; Cumarebo, 4,768 bbl.; Puerto la Cruz, 50,690 bbl.; Caripito, 40,437 bbl., and Boca de Uracoa, 3,475 bbl.

### One New Field in 1943

Creole reported the discovery of one new field in 1943, Yopales, southwest of Oficina. This field was discovered by Mene Grande Oil Co., C.A. (Gulf Oil Corp.), about 3 miles northeast of the old Yopales well in the State of Anzoategui. It is a joint oepration with Creole having a 50 per cent participation. Three producing wells were completed there in 1943.

The increase in drilling operations is reflected by the fact that in the last quarter of 1943, Creole placed eight additional rigs in operation. Previously new drilling had been confined to the Mulata field in eastern Venezuela and the Punta Benitez-101 area in the west. The increase in operations was dictated by the recovery in production for the country, which rose from some 400,000 bbl. per day in January to 580,000 bbl. in December.

Crude runs by the company's Caripito refinery averaged 25,429 bbl. per day and at the La Salina refinery, 3,998 bbl.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

# Planning Starts at Home

THE petroleum industry in this country within a few days will have completed the record for the first 4 months, a period that normally defines the year's pattern of operations, which it will do in this case unless something is done about it.

It is easy to be optimistic about what has been done here in supplying the bulk of the Allied oil requirements. Practically every important production record of the domestic industry has been broken—in several instances by wide margins. Crude-oil production so far this year has been expanded an average of 543,000 bbl. daily. This increase is the equivalent of one-fourth the output during the last year of the previous world war. The actual production this year has been practically 100 per cent of the Government's projected requirements from month to month.

The record in refining and the manufacture of natural gasoline and associated products has been even more striking. Refiners, except in instances where they could not obtain the required crude-oil supplies, have operated 100 per cent or more of their rated capacities. During the first quarter the owners of 450 refineries increased their crude-oil runs to stills more than 700,000 bbl. daily, or 20 per cent over the same period in 1943.

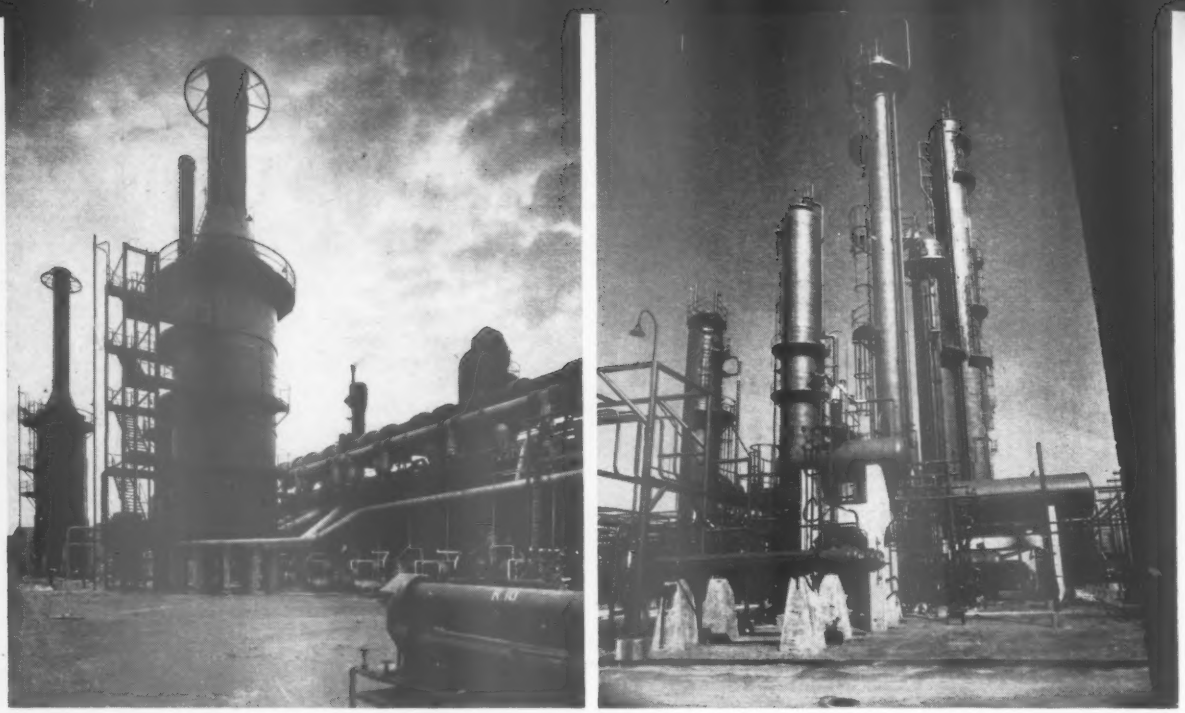
These amazing achievements, which reflect the industry's complete support of the war program, have brought complacency, as regards oil, to Washington, accompanied by an assumption in certain governmental circles that to them, rather than to operators, should go the credit.

A superficial analysis will reveal the unhealthy features of today's oil operations and the dangers ahead. National crude-oil output last week was 503,480 bbl. daily greater than during the corresponding week of 1943, all of which is accounted for by Texas. Outside that state the increases were offset by decreases, with output in several important areas showing a steady decline over the past year. Within Texas, 80 per cent of the expansion comes from West Texas and the Gulf Coast, so that the ability to expand output at this time is largely confined to those two areas.

Going back still further, there is the drilling record. Operators, in an all-out effort to do everything they can under present governmental regulations to find and produce additional oil, have drilled 22 per cent more wells than they did last year. But they are running about 15 per cent behind the projected 24,000 wells for 1944. In the light of the demands projected for this year and later the actual drilling should be at least twice the 24,000-well program of the Government.

The Journal's recent survey of managerial and technical opinion within the industry, leaves no question unanswered as to causes of these unwanted developments. They are entirely due to governmental restrictions centering in prices and in lack of consideration of manpower problems. Nowhere did the Journal's investigation reveal a feeling that operators cannot keep pace with every phase of the war's petroleum responsibilities, starting with the discovery of new oil, provided they are given the required personnel, tools and adequate returns.

These and other allied situations should be important to the Senate's foreign oil policy committee, which starts open hearings next week. Sound foreign planning starts at home, and in this instance, if the domestic house is placed in order, the need for major changes in oil policies outside this country will end.



*Left: Butadiene plant of Standard Oil Co. of California, showing furnaces at left and reactors at right. Right: Acetone-extraction unit of Shell Chemical division of Shell Union Oil Corp. This unit separated butylenes from a mixture of hydrocarbons. The butylenes are later converted to butadiene*

# California's Synthetic-Rubber Project Is Now in Full Operation

***by L. P. Stockman***

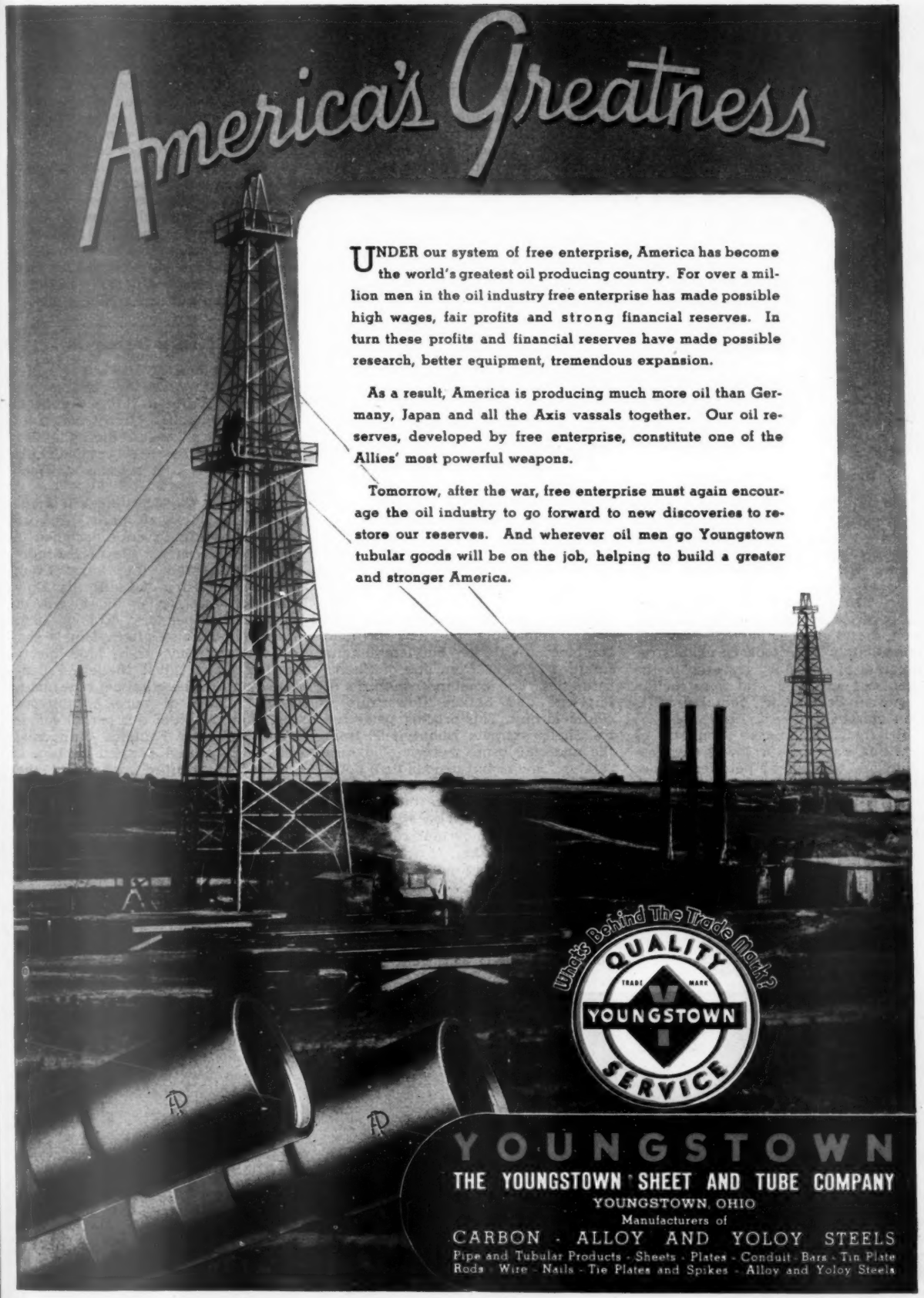
CALIFORNIA'S synthetic-rubber project, started by Rubber Reserve Co. in September 1942, and which is geared to produce 12½ per cent of all buna-S or GR-S (Government Rubber-Styrene Type) is in full operation. The California project is a highly integrated chemical process in the individual plants operated by six companies, all located in the Los Angeles area, and which are linked together in a continuous production flow from petroleum, benzene and alcohol through butadiene and styrene to polymerization units which make the buna-S synthetic rubber. Covering about 250 acres, the project consists of six operational units. Southern California Gas Co., Standard Oil Co. of California, and the Shell Chemical Division of Shell Union Oil Corp., produce and refine the butadiene; Dow Chemical Co. makes the styrene, and Goodyear Synthetic Rubber Corp. and United States Rubber Co. combine the two materials into synthetic rubber in three copolymer plants.

The raw butadiene stocks produced by Southern California Gas Co. from petroleum flow by pipe line to the Shell Chemical plant where the butadiene is extracted and purified. It is then compressed into liquid form and piped to the two rubber companies. Shell Chemical also operates a unit, which converts the residue from the extraction to butadiene. An additional supply of butadiene comes from a new Houdry-type plant operated by Standard of California at El Segundo; the butadiene produced there goes directly to the rubber plants in pressure type tank trucks. The styrene, made from alcohol and benzene by Dow Chemical Co., is pumped through pipe lines to the rubber companies' storage tanks. From these tanks, the basic materials go to the reactor areas where, through chemical reactions controlled by various chemical agents, heat, timing and pressure, the molecules of styrene and butadiene are joined together by polymerization.

Following polymerization the process is a matter of distilling off surplus uncombined butadiene and styrene, coagulating the latex, filtering, washing and drying the resultant rubber. It is then weighed and pressed into 75-lb. bales, ready for the products factories. About 9,000 of these bales will be produced daily. Completion of this project places the Pacific Coast areas in a self-sufficient position so far as rubber and rubber products are concerned.

### Standard's Plant

Research work began in July 1942, at Standard's laboratories at Richmond, and construction was started on the El Segundo plant in March 1943. The plant went into production in January of this year. It was built for Defense Plant Corp., and is being operated by Standard for Rubber Reserve Co. The manufacturing of butadiene starts with butane gas, a petroleum product. Butane is first dehydrogenated at El Segundo by the removal of four atoms of hydrogen from each molecule. Extremely high temperatures are required for one


America's Greatness
UNDER our system of free enterprise, America has become the world's greatest oil producing country. For over a million men in the oil industry free enterprise has made possible high wages, fair profits and strong financial reserves. In turn these profits and financial reserves have made possible research, better equipment, tremendous expansion.
As a result, America is producing much more oil than Germany, Japan and all the Axis vassals together. Our oil reserves, developed by free enterprise, constitute one of the Allies' most powerful weapons.
Tomorrow, after the war, free enterprise must again encourage the oil industry to go forward to new discoveries to restore our reserves. And wherever oil men go Youngstown tubular goods will be on the job, helping to build a greater and stronger America.
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phase of the process, after which the gases are compressed to liquid form. Butadiene, a gas at atmospheric pressure but liquid at high pressure, is extracted from this fluid. To cool the butadiene mixture from its high temperature, the plant pumps large volumes of sea water from the Pacific Ocean, a mile away.

At another stage of the job, hot air, at high temperature, is blown through the reactors, where the conversion to butadiene takes place at a rate of 80,000 cu. ft. a minute, or 360,000 lb. per hour. This air must previously be purified by electrostatic filters which remove any dust that might affect the action of the catalyst used to bring about the conversion. Heat from this air is then recovered in high-pressure boilers, where it generates 55,000 lb. of steam hourly for operation of the many pumps and for process heating. The compressor installation handling the various hydrocarbon gas streams in the process totals 7,500 hp. It is the largest compressor installation in the West.

### Southern California Plant

On June 26, 1942, Defense Plant Corp. requested Southern California Gas Co. to convert its Aliso Street gas works to the manufacture of butadiene. This plant, which had been used as a standby unit for several years, had a capacity of 50,000,000 cu. ft. of artificial gas per day derived from diesel and gas oil. The company immediately undertook an exhaustive program of necessary research in the processes involved and construction began in September. Actual production started June 18, 1943.

Briefly, the process consists of cracking naphtha, or low-grade gasoline, and obtaining a petroleum fraction composed of various hydrocarbon chains containing four carbon atoms. In the industry this is called the $C_4$ cut. The constituent gases include butane, butylenes and butadiene. The crude butadiene and butylenes or $C_4$ fraction are recovered by conventional gas-absorption methods, from the gases produced from the petroleum vapors and are sent by pipe line to Shell Chemical Co. for purification.

The other ingredients obtained as byproducts are used in the manufacture of fuel gas, fuel oil and aviation gasoline. The raw materials for the process are obtained from refineries of Shell, Tide Water Associated, Wilshire, The Texas Co., General Petroleum, Union and Standard of California.

### Shell Operations

Immediately after Pearl Harbor, the Shell companies offered the benefits of years of experimentation to the Government, and subsequently, under agreement with the Government's Rubber Reserve Co., began construction, in September 1942, of the butadiene units of the California Synthetic Rubber Project. From Southern California Gas Co. comes a material called $C_4$ fraction. This material is moved by pipe line to Shell Chemical plant where it is treated in a series of intricate, precisely timed, heat controlled, chemical operations. Its chief components are butadiene and butylene, with a trace of acetylene which must be removed. Its removal is the first process and is brought about by conversion to the other components. The resultant butadiene-butylene mixture is fed into an extraction system where the butadiene is separated from the butylene.

The remaining butylene is then combined with a butylene-butane mixture brought from one of Shell's refineries. The combined mixture of butylene and butane flows into a cold-acid unit. This process, perfected by Shell, extracts isobutylene from the material, using sulfuric acid as a catalyst. The isobutylene is then polymerized. The resuting diisybtulene and heavy polymers are then sent to one of Shell's refineries where they are used as an important constituent in aviation gasoline.

The butanes and normal butylene removed from the process are sent through an extraction unit where the butanes are removed and moved by pipe line to Shell's refinery for use in aviation-gasoline manufacture. The normal butylenes are converted into butadiene by a catalytic process, the products from which are combined with Southern California Gas Co.'s butadiene and purified in the butadiene-extraction unit. Pure butadiene is then piped to the copolymer units operated by the rubber companies, to be converted with the styrene to GR-S. Unreacted materials from the copolymer plants are recovered and returned to the Shell Chemical plant for reprocessing. The Shell Chemical plant is an integrated unit which operates continuously and in order to maintain this schedule in war times, a substantial number of the employes are women.

### Dow Chemical Styrene Plant

Dow Chemical Co.'s Los Angeles styrene plant was the first of the California synthetic-rubber units to go into production. Construction of this plant was begun in September 1942, and in less than 9 months, in June 1943, the first styrene was produced.

Styrene at the Dow plant is made in a group of small units, each an integral operating section designed to manufacture certain chemicals independently of the other units. From the wine industry of California, Dow Chemical Co. receives 15,000 gal. of pure alcohol per day. This is used in the manufacture of ethylene, a gas, and this gas is moved by pipe line to another plant called the ethyl benzene plant. In the ethyl benzene plant, 15,000 gallons of pure benzol are used daily. Much of this benzol comes from the Kaiser Fontana, California, coke ovens. Ethyl benzene, a liquid, is piped to a third plant, and the material is processed in the presence of catalysts and crude styrene is produced. Thus, by joining two raw materials and passing them through 35 miles of pipe line, and through white-hot gas furnaces, crude styrene emerges. The styrene is then passed to a fourth plant and is purified by distillation.

*Interior of compressor house at Standard of California's butadiene plant. This 7,500-hp. installation is said to be the largest in the West*

## Record High Established by May Oil-Production Quota

WASHINGTON.—Another new high in the daily production rate of petroleum liquids is established in the certification to oil-producing states for May by Petroleum Administration for War. The new rate, 4,818,500 bbl., tops April by 93,500 bbl.

More than two-thirds of the increase is allowed the southwestern states (District 3) of which Texas receives 60,000 bbl. daily of the total 71,300 bbl. certified to the Southwest.

Eastern and midwestern states (Districts 1 and 2) are granted a slight increase to conform with seasonal performance.

In the Rocky Mountain states (District 4) the rate is increased approximately 2,000 bbl. daily to balance production with increased demand resulting from improved transportation in that area.

California (District 5) is allowed 10,000 bbl. more daily, most of which PAW attributed to completion of new wells.

Following are the production quotas for May by districts and states:

| | Certified total petroleum liquids | Estimated natural gasoline and condensate |
|---|---|---|
| **District 1—** | | |
| New York | 13,600 | ..... |
| Pennsylvania | 43,300 | 1,300 |
| West Virginia | 15,800 | 6,800 |
| Total | 72,700 | 8,100 |
| **District 2—** | | |
| Illinois | 233,500 | 13,500 |
| Indiana | 14,000 | ..... |
| Kansas | 290,800 | 5,800 |
| Kentucky | 25,700 | 2,700 |
| Michigan | 54,300 | 300 |
| Nebraska | 900 | ..... |
| Ohio | 9,700 | 500 |
| Oklahoma | 358,000 | 28,000 |
| Total | 986,900 | 50,800 |
| **District 3—** | | |
| Arkansas | 81,700 | 5,000 |
| Louisiana | 395,000 | 45,000 |
| Mississippi | 43,000 | ..... |
| New Mexico | 116,600 | 4,900 |
| Texas | 2,103,000 | 131,000 |
| Total | 2,739,300 | 185,900 |
| **District 4—** | | |
| Colorado | 7,200 | ..... |
| Montana | 24,700 | 300 |
| Wyoming | 101,200 | 7,200 |
| Total | 133,100 | 7,500 |
| **District 5—** | | |
| California | 886,500 | 46,500 |
| Total U.S. | 4,818,500 | 298,800 |

## Output of Natural Gasoline Surpasses All Records

Daily average output of natural gasoline and allied products continued to rise in February, reaching a new high, according to U. S. Bureau of Mines. The 10,956,000 gal. for that month compares with 10,596,000 gal. daily average in January. Conspicuous increases were recorded in the Panhandle, East Texas, Oklahoma and California, in that order. Total stocks dropped to 178,290,000 gal. from 180,432,000 gal. reported for January 31, and the 209,832,000 gal. reported on February 28, 1943.

## Bill Would Subsidize Crude-Oil Production

WASHINGTON.—A plan for subsidizing crude-oil production is offered in a bill (H.R. 4644) introduced in the House April 20 by Rep. Jerry Voorhis of California. The bill would direct Office of Price Administration and Reconstruction Finance Corp. jointly to set up programs for speculative loans for exploratory drilling and to guarantee a profit of 5 cents per barrel to operators of stripper and marginal-cost wells. The Voorhis bill is designed to encourage development of new fields by:

1. A loan program under which the Government would advance money for drilling on unproven oil lands. If oil is discovered the Government would be paid back twice the investment at the rate of one-eighth of the production from any well. If no oil is discovered the Government would cancel the loan.

2. Providing a subsidy to sustain or increase present production of oil from stripper wells. Under the Voorhis plan the Government would guarantee any stripper-well operator for the duration of the war and 6 months thereafter return of his cost of operation plus 5 cents per barrel profit. Any difference between the ceiling price received by the operator and the cost plus 5 cents per barrel would be paid as a subsidy.

## Plans for Merger of Darby With Sunray Announced

Plans for absorption of Darby Petroleum Corp. by Sunray Oil Corp. have been agreed upon in principle by officials of the two companies. Holders of the 352,000 outstanding shares of Darby stock would receive $40 a share under the plan, payable in convertible preferred stock. The merger must be approved by stockholders of both companies.

Clarence H. Wright is president of Sunray and R. Elmo Thompson is vice president. Darby is headed by J. F. Darby, president, and Don Bothwell, vice president.

Sunray last October acquired Superior Oil Corp. in a merger which brought Thompson, then president of Superior, to Sunray as executive vice president.

Sunray then had a daily net crude oil production of 9,000 bbl. and Superior 4,000 bbl. Darby has a daily output of 6,100 bbl., which will give Sunray a total of 19,100 bbl. daily. Both companies operate in Oklahoma, Kansas, Texas, New Mexico and Arkansas.

# DEATHS

**Dr. Roger Clark Wells,** 66, chief chemist of U. S. Geologist Survey, died April 19 in Washington.

**E. V. Winterer,** 46, chief geologist of Superior Oil Co. of California, died in Los Angeles recently. He was a graduate of University of California and received his master's degree from that institution in 1922. He joined Superior in 1928 and headed wildcat activities in New Zealand which were interrupted by the World War.

**C. E. Shoenfelt,** 58, geologist and petroleum engineer, of Denver, publisher of Petroleum Information, a standard annual review of the industry in the Rocky Mountain area for the past 16 years died April 17. He was an independent operator in Oklahoma for years and went to Colorado 28 years ago. He was with Marland Oil Co. at first and then established an independent office.

**W. I. Merritt,** 56, driller for The Texas Co. and in that company's service 28 years, died April 18 in Houston.

**Henry Lilly,** 79, first to strike oil in the Louden field of Fayette County, Illinois, died April 18. There are 25 producing wells on the farm where he died, and he made a fortune in oil.

**R. Pat Henry,** 63, former independent oil operator who later joined the staff of Oklahoma Tax Commission, died April 21 in Oklahoma City.

**James L. Pinkerton,** 76, Bradford, Pa., formerly a rig builder in northwestern Pennsylvania oil fields, died April 15. He retired about 2 years ago.

**Ralph R. Ogden,** 70, independent oil operator of Austin, Tex., met death April 19 in an automobile accident 5 miles south of Chickasha, Okla.

**Thomas R. Chapman,** 59, oil-lease broker of Tulsa, died April 19.

**E. W. Foreman,** 52, assistant to D. L. Ferguson, general superintendent of Standard Oil Co. of New Jersey's Bayway, N. J., refinery, died recently.

**Arthur T. Rouse,** 38, Longview, Tex., who recently received an honorable discharge from military service, died April 17 of injuries suffered a short time before when he fell from a derrick in the West Edmond field. He was employed by a drilling contractor.

**Charles H. Thomas,** in the oil business in western Pennsylvania 52 years, died April 24 in South Orange, N. J. He was a charter member of the Twenty-Five Year Club of American Petroleum Institute.

# Why Men Who Know Compressors

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# Deepest Sucker-Rod Pumping East of Rockies Is in Buckner Pool, Arkansas

*by Paul Reed*

**Experience in pumping from 7,200 ft. in the Buckner, Arkansas, pool indicates that no extraordinary problems are to be expected there in the operation of beam-well sucker-rod equipment. In several years of such pumping operations the types of equipment used have been subjected to extended tests of their adequacy for meeting requirements. Well servicing has been less than would be expected for pumping from this unusual depth.**

PUMPING from the unusual depth of approximately 7,200 ft. in the Buckner pool of southern Arkansas attracts attention because it represents the deepest sucker-rod operations in the United States east of the Rocky Mountains.

The few pumping wells of this field lifting oil from low depths are equipped with standard equipment which has functioned with surprisingly little trouble, giving evidence that such equipment is capable of pumping from considerably greater depths.

Production in the Buckner pool comes entirely from the Smackover limestone which is found at approximately 7,200 ft. The 29 wells in the pool include 10 wells pumping from below 7,000 ft.; 6 wells pumping from 4,000 ft. to 5,000 ft. fluid levels; and 13 produced by flowing or gas lift. Oil is 30° A.P.I. gravity; salt water produced has the unusually heavy weight of 10 lb. per gal.

### Reservoir Conditions

Permeability of the Buckner pool varies more widely and is more erratic than that of the considerably more prolific Magnolia pool to the eastward. The Buckner field at present has an average static bottom-hole pressure of approximately 2,450 lb. However, the wide variation in permeability from well to well results in great differences in pumping fluid levels. The Smackover limestone in the Buckner pool is a water-drive reservoir producing with approximately a 250 to 1 gas-oil ratio. Wells pumping from the deeper levels handle fluid containing, in some cases, as much as 75 per cent water.

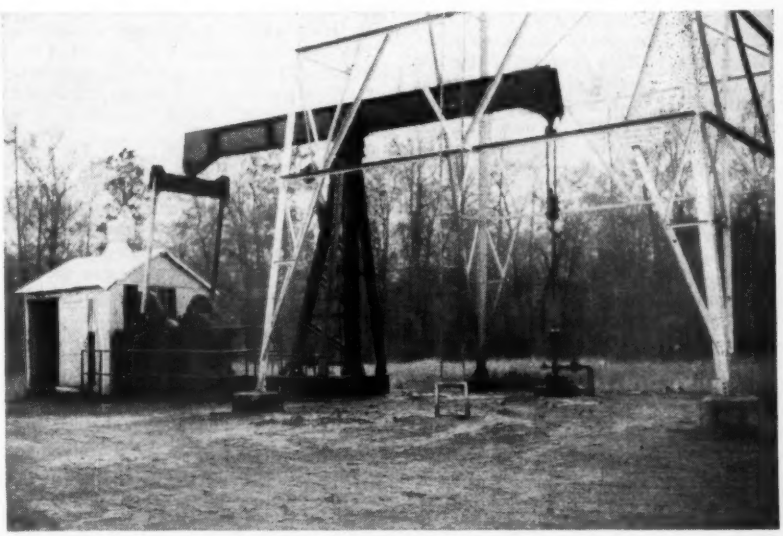
Information in this article has been procured largely from The Carter Oil Co. which has given close attention to the factors involved in deep-well pumping in the Buckner pool.

The base allowable for the Buckner pool is 87 bbl. per well per day. This is being produced by those pumping wells located where the permeability of the formation is sufficiently high for delivering this volume to the well bore. Wells pumped from the 7,000-7,200-ft. level produce between 20 and 45 bbl.

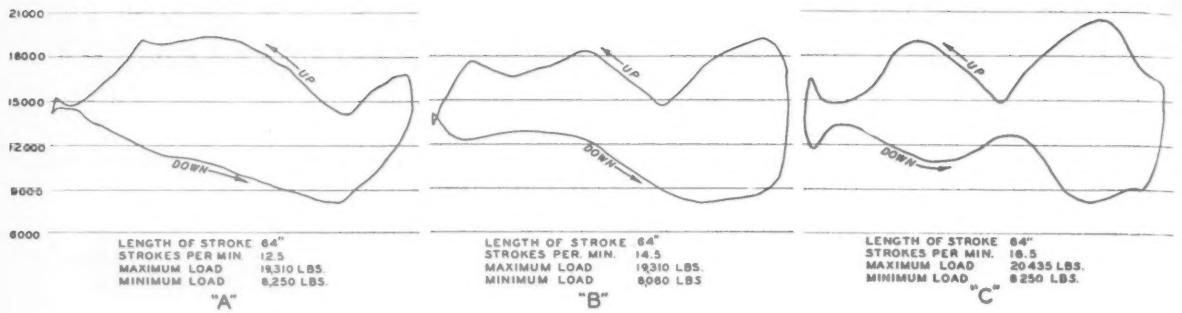
Both the wells pumping from the 4,000-5,000-ft. and from 7,200-ft. levels have similar surface equipment. Beam, twin-crank, single or double-reduction units, are powered with gas engines of 40 to 60-hp. ratings, of single and multicylinder, horizontal and vertical types.

### Pumping Equipment

The Carter Oil Co. (which has six pumping wells, eight gas-lift wells, and five flowing wells in the Buckner field) equips wells pumping from both the higher and lower levels with 2½-in. tubing. Sucker rods are combination strings of ⅞-in. and ¾-in. for higher level pumping, pump plungers of insert pumps are 1¾ in., and for the lower level 1¼ in. to 1½ in. Pumps are all of metal-to-metal type



*Well pumping in Buckner pool from 7,190 ft.*




*Dynamometer cards for Buckner pool well pumping 153 bbl. of fluid daily from 7,183 ft.*

of various makes which have been found by experience to be more effective in the deep-well service.

The following observations have been made of wells pumping from lower levels: Most wells are pumped from 12½ to 19 strokes per minute with 64-in. stroke. Dynamometer tests show polished-rod loads of 16,310 and 19,310 lb. Cards obtained from such tests resemble in character those from the 6,000-ft. wells in Oklahoma City.

The dynamometer cards accompanying this article show performance of a Carter well where load was 19,310 lb. with 64-in. strokes at the rate of 12.5 per minute. When pumping at the rate of 14.5 s.p.m. with strokes of the same length, there was no observed change in peak load but the load curve was considerably altered, reflecting the nature of harmonics in the rod string. Further increases in speed appreciably alter the load characteristics.

### Well Servicing

Servicing of wells is not required more frequently than in many wells producing from the usual depths. Most of the trouble came in the early part of pumping when it was necessary to pull several times in the first 2 or 3 months to remove trash. A rod-and-tubing job takes 2 days or more.

Hydrogen sulfide content of the gas at Buckner is sufficient to suggest possibility of embrittlement of the rods, but in 6 years of pumping no such embrittlement has been observed. There has been no corrosion in most of the wells.

In two of the Carter wells there has been corrosion in the pony rod and parts below it, such as cages and pump parts. Parts attacked have been replaced with others of better material, such as chrome plate and stainless steel. But while this procedure eliminated corrosion, for the part dealt with, it was noticed that later another part of the pump equipment assembly would be corroded. The company is studying the situation to determine whether this corrosion is due to electrolytic action or whether it is due to salt-water corrosion. A patented zinc-and-copper device has been placed under one of the pumps; this is of a kind used in some areas to prevent boiler corrosion. There has not yet been opportunity to observe results.

Pump failures have been varied including cut seats as well as plunger and liner failures, but two similar failures have seldom occurred, in succession. Reviewing experience with this deep-well pumping, it was observed that Carter had rod breaks only at one well; at this well three ⅞-in. rod breaks occurred between 500 and 600 ft. for reasons which may be attributed to causes other than the depth of the well.

### Increasing Efficiency

Wells with small production from such depths would be expected to have low volumetric efficiencies. These have been improved by close study of the operating conditions which has resulted in shortening pump strokes, decreasing pump speeds, decreasing pump diameters and adoption of part-time pumping in certain cases.

Gas lift was used more generally earlier in the life of the field when ample gas was available at low cost. For producing from the upper levels gas lift would be used to a larger extent if cheap gas were available. Sucker-rod pumping was installed for economically lifting the small amounts of oil to be obtained from the lower levels.

Echometer and dynamometer tests have been conducted at a few wells. From these tests and from pumping characteristics, such as may be determined by raising and lowering the pumps, it has been indicated that the fluid levels are relatively close to the bottom. The well, on which dynamometer test data are presented here, has top producing depth of 7,264 ft., pump depth of 7,183 ft., echometer depth of fluid 7,016 ft. Fluid production consisted of 153 bbl. daily of which 70 per cent was water.

As the trend of the industry is toward producing from continually deeper horizons, pumping from the lower levels of the Buckner pool represents a significant test of standard sucker-rod equipment.

## Sucker-Rod Pumping of Deep Production

WHEN operators have faced the necessity of considering pumping from greater depths than those with which the industry previously had experience there has frequently been considerable concern over the possibility that difficulties might be increased proportionately or even more so. Operating with several thousand feet of elastic sucker rods has prospects for complicated problems as well as a low mechanical pumping efficiency. However, in the last 15 years sucker-rod pumping has been adapted to one deep field after another. After several hundred wells were being pumped from depths below 7,000 ft. in California, it was observed that excessive trouble was not encountered where adequate equipment had been installed. In fact many of the deep-well problems could be overcome more readily than those arising from common conditions in comparatively shallow wells. With proper analysis of well conditions much has been accomplished to achieve more efficient and economical pumping.

At the beginning of producing from the Oklahoma City field, there was a widespread opinion among operators that pumping from 6,500 ft. would be economically impossible. Early trouble with sucker-rod breakage was reduced to a marked extent by close study of rod requirements and selection of the proper sizes of pump plungers which is vital for efficient pumping since the size of the plunger affects both the displacement of the pump and the load on the entire pumping equipment. The advantages to be obtained in numerous cases by reduction of bore sizes were demonstrated. Closer study was given to the nature of pumping operations and sucker-rod harmonics in order to determine correct polished-rod strokes and speeds.

In discussions of deep sucker-rod pumping there appears to be particular interest in possibilities for formations much deeper than those from which production is now pumped.

# Socony-Vacuum Uses Continuous Automatic Lead Blender

*by John P. O'Donnell*

CONTINUOUS, automatic blending of tetraethyl lead with gasoline, first applied at the East St. Louis, Ill., refinery of Socony-Vacuum Oil Co., Inc. (Lubrite Division), is now being adopted by a number of other refineries. The method, involving the controlled induction of lead into the main gasoline stream, is new to the oil industry, although based on principles which have operated successfully in other industries.

The original blender at the Lubrite refinery was designed and installed by Proportioneers, Inc., in cooperation with the refinery's engineering department and L. T. Doiron, chief chemist, as a complement to the other Proportioneers equipment already in use there for the continuous blending of inhibitor, dye, butane, etc.

As a result of the extended experience of the Socony-Vacuum refinery, a number of advantages are claimed for the new approved continuous method over the previously approved and generally used batch-blending method. These advantages are:

**Homogeneous, uniform continuous mixing of gasoline and tetraethyl lead with minimum costs and wastage is the aim of refiners since the use of lead began. This article describes a continuous system, designed and operated to give such results. TEL content of the blended product varied from plus-minus 0.01 cc., to a maximum of 0.06 cc. per gallon.**

1. Immediate and complete mixing of the fluid and gasoline so that a finished and uniformly blended gasoline is taken from the treating-plant manifold ready for immediate shipment or storage.

2. Elimination of all batch blending or in-tank mixing, saving operator time, power consumption and loss of light fractions.

3. Reduction in the dosage tolerances and possible waste of fluid.

4. Prevention of heavy lead concentrations in the lower sections of storage tanks and elimination of the consequent loss of effective fluid.

5. Provision for a visible check of treatment accuracies with a continuous record of gasoline production and lead consumption, and the inclusion of batch registers in both the gasoline and lead totalizers, permitting check on individual runs.

6. Elimination of tanks formerly used for holding gasoline prior to blending in storage tank.

The continuous, automatic blender is a modification of the standard "weigh" tank and eductor unit now employed at refineries and terminals for the blending of tetraethyl lead. At the East St. Louis refinery the new unit was so designed that, in case of emergency, it would be possible to resort immediately to conventional batch blending. No basic change is required in the piping of the generally used batch-blending system and,

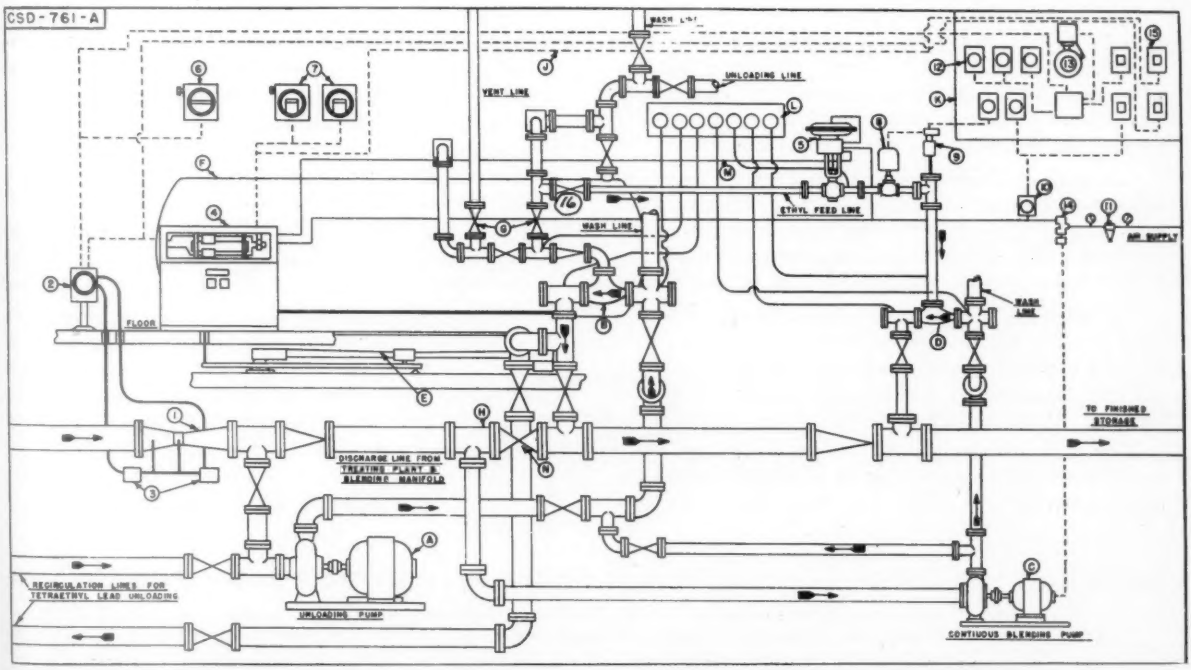
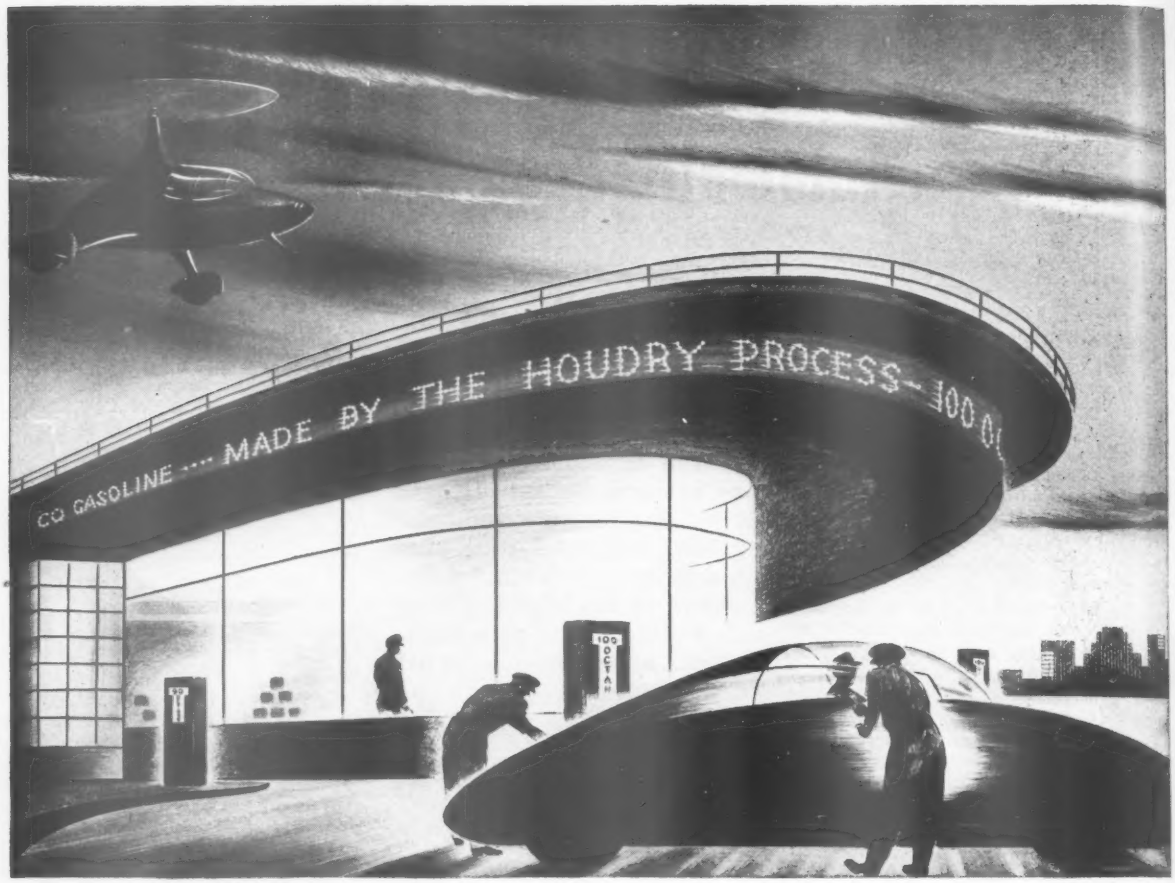



*Fig. 1—Schematic diagram of installation of a continuous automatic 60-ton ethyl blender*




# FUEL OF THE FUTURE...READY NOW!

THEY say the first post-war cars will be little more than dolled-up 1942 models. Probably so. But after enough of these "bread-and-butter" automobiles have been produced to satisfy bare transportation necessities, there'll be *some* changes made!

Can anybody doubt that the war's tremendous technological advances will bring radically better automobiles in the future? It may take time—for new designs, new dies, new tools. But one thing the car of the future *won't* have to wait for, is the fuel of the future!

For make no mistake, the fuel of the future will be catalytically cracked. And there are some thirty Houdry-licensed plants now producing millions of gallons of it every day for the air forces of the United Nations.

True, this is high-octane *aviation* fuel; better gasoline by far than is required by any motor car yet built. But that will merely be a challenge to automotive engineers—who usually have had to wait for fuel improvements to catch up with their designs, instead of vice versa.

The first—and by all odds the foremost—catalytic cracking process is the Houdry Process. It has furnished all but a small percentage of the United Nations' total war needs for catalytic aviation gasoline.

It is also the *only* catalytic process which has proved its ability to produce motor gasoline under the competitive conditions of peace-time operation.

That is one reason why most Houdry licensees have built and financed their Houdry equipment without government aid. When peace comes, these forward-looking refiners will be able to convert their Houdry facilities immediately for the economical production of a far better motor gasoline than any you have ever known—the fuel of the future!

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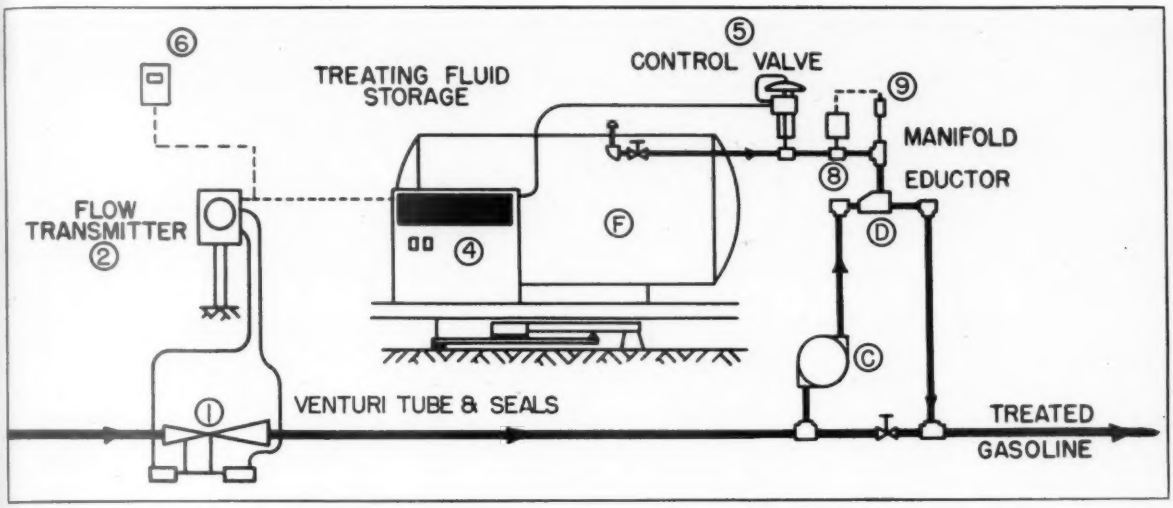



*Fig. 2—Flow diagram for continuous "loss-in-weight" ethyl blender*

at the Socony-Vacuum refinery, there is only one ¾-in. extra-heavy pipe added to the conventional system, just above the No. 2 valve. Referring to Fig. 1, this line contains a manually operated shutoff valve (16), a characterized flow control valve (5), a check valve (8), and a vacuum alarm switch (9), and runs to the vacuum inlet of a small eductor (D), operated continuously by a 40-g.p.m. stream of gasoline through the small eductor pump (C).

The new method is automatic as well as continuous with all controls being operated by electric or air impulses. Gasoline from the treating plant is metered through a Venturi tube (1), in the main discharge line. The variable flow through the meter is transmitted through a Chronoflo transmitter (2), by directly proportional electrical signals. These signals operate the gasoline flow totalizer (6), on the control panel in the pump house and also regulate the volume of lead which is permitted to be drawn from the ethyl tank (F), installed in a separate building remote from the pump house. The suction and discharge lines to the small eductor pump in the ethyl building are also connected to the treating plant manifold (H).

### Constant Vacuum Maintained

The 40-g.p.m. eductor pump, operating continuously, maintains a constant flow of gasoline from the treater manifold, through the eductor and back to the manifold. The constant flow maintains a constant vacuum by which lead may be withdrawn. The return flow carries with it the amount of lead which has been permitted to be withdrawn from the weigh tank and introduces it into the main gasoline stream at the treating-plant manifold.

The rate of gasoline flow through the Venturi tube is transmitted through the Chronoflo transmitter to a motor-driven balance or poise weight on the weigh-tank scale beam (4); this weight is mounted so that it can be retracted on the scale beam by the motor, but the rate of retraction is always directly proportional to the flow of gasoline and subject to manual setting of a single ratio control dial, calibrated directly in cubic centimeters of tetraethyl lead per gallon of flow to be treated. If the gasoline flow is uniform, the balance weight moves uniformly along the beam, allowing a predetermined amount of fluid to be educted into the gasoline stream. If the flow of gasoline increases, the balance weight moves at a faster pace and increases the rate of lead eduction. Thus an exact ratio between the flow of gasoline through the Venturi-tube meter and the loss-in-weight rate at which the motor-driven balance moves across the scale beam is maintained.

The outboard end of the scale beam is linked to an air relay assembly. As

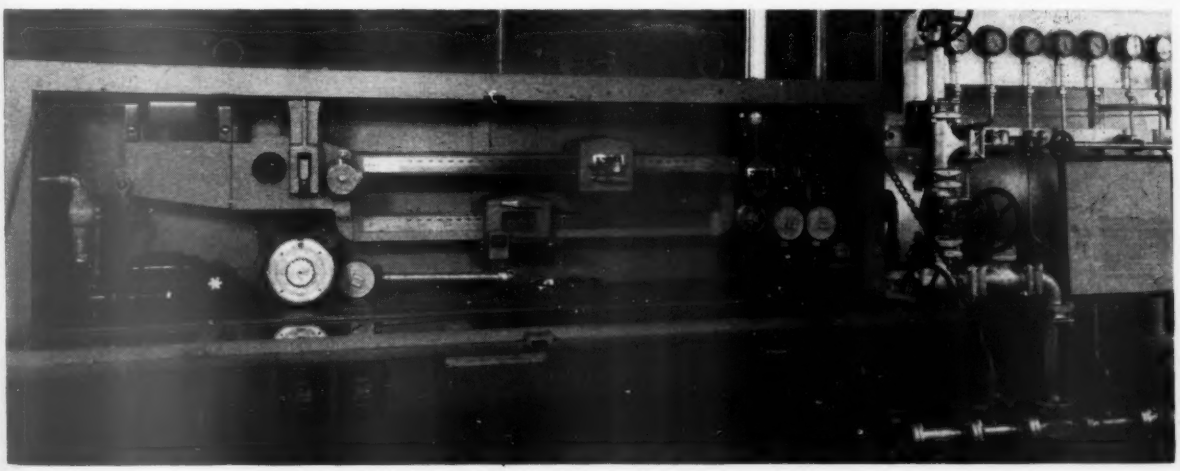
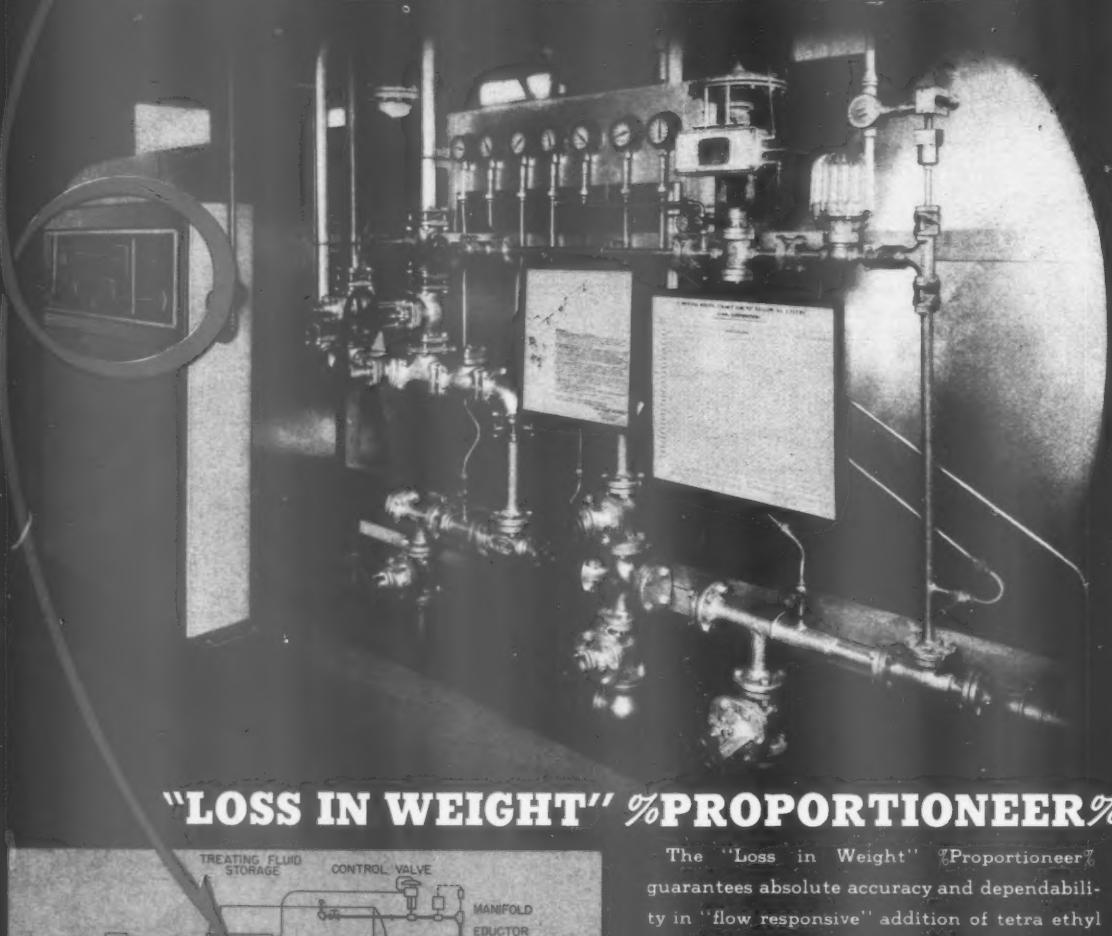


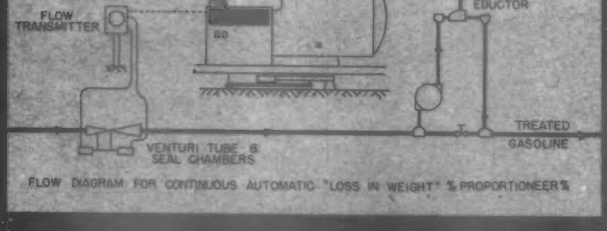
*Fig. 3—Closeup view of scale beam showing dosage adjustment at left, and automatic control at right. (Glass inspection window is opened)*

# The Brain

## FOR "PRODUCTION LINE" BLENDING



## "LOSS IN WEIGHT" %PROPORTIONEER%



FLOW DIAGRAM FOR CONTINUOUS AUTOMATIC "LOSS IN WEIGHT" %PROPORTIONEER%

The "Loss in Weight" %Proportioneer% guarantees absolute accuracy and dependability in "flow responsive" addition of tetra ethyl lead for octane adjustment of gasoline.

Look to %Proportioneers, Inc.%, leaders in the field of proportioning equipment, for engineering advice on the transition from *Batch* to *Continuous* or "Production Line" methods. For recommendations on your particular requirements send complete job conditions.

# % PROPORTIONEERS, INC. %

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*FOR APPLICATION OF THIS EQUIPMENT, SEE PAGE 43 THIS ISSUE*

the poise weight is retracted, the scale is lightened, which tends to make the beam go high and this tendency operates through the air relay to move the air-operated lead control valve further open, allowing lead to be withdrawn by the eductor and thereby tending to return the beam to balance. The specially calibrated control valve with its air-operated diaphragm motor is responsive to the slightest change in the position of the scale beam and is continuously positioned to increase or decrease the amount of ethyl fluid being withdrawn by the eductor, and thereby correct any tendency to unbalance in the scale beam. As long as the "apparent" weight on the beam is in perfect balance with the decreasing weight of the tank, the beam remains in balance. This shows that equilibrium is maintained between the opposing tendencies and that the adjusted ratio of lead to gasoline is being maintained.

**Scale Enclosed in Cabinet**

In the continuous blender installation, the scale and poise assembly, redesigned for greater accuracy and sensitivity, is enclosed in a welded steel cabinet with a hinged, glass inspection window. This cabinet not only protects the unit from air currents, which would disturb the balance, and from dust and dirt, but also prevents unauthorized persons from tampering with it.

Uniformity of the blend obtained by using the continuous blending method is indicated by the following tables showing analyses of gasoline made by Socony-Vacuum. Samples were taken from different parts of the storage tanks. The absence of lead concentrations in the bottom is apparent in the data.

| | Tank A | | Tank B | |
|---|---|---|---|---|
| | Oct. No. | cc./gal. | Oct. No. | cc./gal. |
| Top | 80.7 | 1.28 | 80.4 | 1.25 |
| Middle | 80.6 | 1.26 | 80.2 | 1.21 |
| Bottom | 80.7 | 1.27 | 80.5 | 1.27 |

Since it is possible with continuous blending to run direct from the gasoline-treating plant to storage tanks, the time and labor consumed in running to one tank, then to another to pick up the lead and recirculating the contents of the latter for several hours are avoided. It also, as is obvious, eliminates the use of intermediate tankage.

In addition to the previously listed advantages, there are a number of safety features claimed for this type of blending.

A. Concentrations of lead fluid are reduced far below strengths encountered in the batch system since no fluid is dumped in a short period but all of it is dribbled into a comparatively large volume of gasoline at the eductor and immediately mixed with the main stream.

B. Over or undertreatment results in an unbalance of the scale beam and lights a warning signal on the instrument panel. If the abnormal treatment persists for more than 2 or 3 minutes, the warning light remains lit and an alarm bell notifies the operator.

C. Failure or abnormal decrease in vacuum at the eductor lights a signal on the panel board. Similar automatic action results if there is a failure or unusual decrease in instrument air pressure. Remote control in the treating plant control room permits the treating-plant foreman at that point to stop the eduction of lead if necessary.

D. Finally, if serious trouble did develop, the plant may be put into immediate operation as a batch type unit.

The only difficulty of consequence encountered in operation of the unit resulted from operation during warm months of the year with 8.5-lb. R.v.p. gasoline. It was found necessary to maintain the vapor pressure on the eductor stream under 8 lb. since, otherwise, the vacuum may be broken on the weigh tank.

As might be expected in an initial operation, some of the usual mechanical difficulties were encountered during the first few months, such as clutch slippage, small drive-chain stretching, and compressor belt jumping off. These resulted in no lost time and were easily remedied.

The continuous method of inducting tetraethyl lead into a gasoline stream has been in use at the Lubrite refinery for over 4 years and has proved a successful and economical way of automatically leading a gasoline ready for shipment or storage.

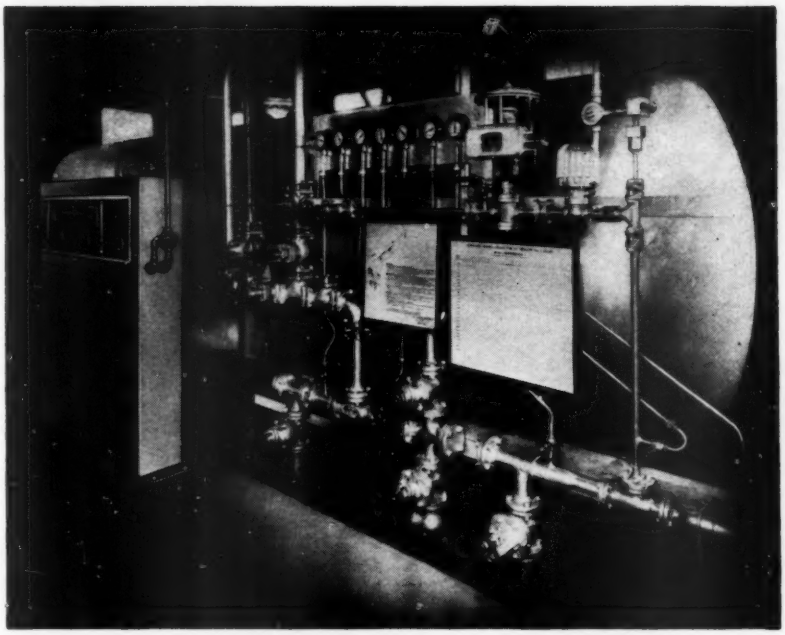

*Fig. 4—Standard batch blender for tetraethyl lead showing new automatic scale head and additional ¾-in. eductor line*

# BOOKS

*MECHANICAL PROPERTIES OF METALS AND ALLOYS. Circular C447, of the National Bureau of Standards of the U. S. Department of Commerce. By John L. Everhart, W. Earl Lindief, James Kanegis, Pearl G. Weissler, and Frieda Siegel. 481 pp. $1.50.*

The preparation of this volume was undertaken to bring the information up to date that was contained in an earlier edition of the work, by the inclusion of data on the numerous new alloys which have been introduced since 1924. Because of the increasing importance of knowledge on the properties of metals at high and low temperatures, the tables dealing with materials under these conditions have been expanded.

## Prospecting by Radio

TO the present methods being used in an attempt to locate either structures which may bear oil or oil deposits directly, there may soon be added radio prospecting. Reconnaissance surveys have been made in several foreign countries, according to reports. Wider adoption of the presently experimental methods, including geochemical and electrical methods must wait until it is generally recognized that petroleum accumulations have modified the physical properties, the chemical composition and biological equilibrium of formations lying above them near surface.

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# TESCO

BETTER STEEL FOR MODERN INDUSTRY

# N.A.C.E. ABSTRACTS

**A variety of corrosion problems in different branches of the oil and gas industries was discussed at the annual convention of the National Association of Corrosion Engineers, April 10-12, at Dallas. Significance of the proceedings was discussed by E. H. Short, Jr., in April 13 issue, page 114, in article titled: "Saving of Steel Chief Theme at Corrosion Engineering Conference"**

## A Method for Studying Anodic And Cathodic Areas Under Cathodic Protection

**OTHA C. RODDY and LYLE R. SHEPPARD, Interstate Natural Gas Co.**

BECAUSE of differences of opinion among corrosion engineers regarding what happens at full protection current densities and regarding the full protection point and its determination, studies of anodic and cathodic areas under cathodic protection are important.

A corroding unit composed of two electrodes in a single electrolyte can be used One electrode is made anodic and the other cathodic by an external battery. The corroding currents can be controlled by external resistances. A controlled protecting unit is combined with the corroding unit to make the studies. Such an arrangement allows studies to be made of the electrical reactions and current distributions on the surfaces of the corroding anode and cathode while both are under cathodic protection.

Studies have led to the following conclusions:

When two direct currents flowing in opposite directions are superimposed in one circuit they cancel each other and only the resultant current flows, not the full value of both currents. The anodic area, usually being smaller than the cathodic area, is the main controlling factor in current flow in a corroding unit or cell. The colorimetric method (using potassium ferrocynide for iron electrodes) for determining the full protection point in a solution is probably more accurate than the weight-loss method. Indications are that the calculated protecting circuit resistance-current density curve shows the full protection point more readily than the potential-current density curve. At full protection the corroding anode and cathode have equal interface resistances and polarizations. The electrolyte increases in alkalinity and electrical conductivity with both increased protection and time. Electrode interface resistances can and should be eliminated in measuring solution resistivity. Tests in limited spaces should not be taken to give absolute values for use in unlimited spaces, but only to show trends. Time is a factor not properly considered in cathodic protection.

## A Study of Corrosion in Gas and Condensate Wells in the Katy Field, Texas

**F. W. JESSEN, Humble Oil & Refining Co.**

REPRESENTATIVE data from a well in the Katy field, Texas, indicate that corrosion of steel may be correlated with the rate of flow of gas which in turn is believed to contribute largely to the rate of absorption of carbon dioxide. There is evidence that the rate of reaction of dissolved carbon dioxide with steel at pressures and temperatures encountered in the operation of gas and condensate wells seems dependent on the rate of absorption of carbon dioxide and the length of time the fluid film is in contact with the metal. The continuity of a fluid film is questionable at the higher rates of flow. It is also believed that the ratio of condensed water to hydrocarbon condensate is also important in corrosion of steel by high-pressure gas.

## Some Studies of Waters Produced By High-Pressure Wells

**WALTER F. ROGERS, Gulf Oil Corp.**

WITHIN the past 2 years considerable attention has been directed to the problem of corrosion of high-pressure wells. Corrosion rate in some condensate fields has been reported as severe which becomes of special economic importance because of the high-pressure equipment employed.

A remedy for such severe corrosion is the use of alkaline treating materials to raise the pH of the water to pH 8.0. Some corrosion will still occur because of the high temperature and velocity of the gas but its severity will be diminished.

## Use of Zinc for Cathodic Protection

**H. W. WAHLQUIST, electrical engineer, Ebasco Services, Inc.**

ZINC anodes have been used for perhaps 50 or 75 years in marine installations for preventing corrosion of propeller shafts in fittings on the stern of a boat. Only in recent years have zinc anodes in cathodic protection of pipe lines received much attention. Little information is available in the form of technical publications dealing with the long-time performance of zinc anodes used for cathodic protection in different types of soil.

Since the zinc anodes serve both as a current source and as a ground bed, the problem of providing and maintaining large masses of metal in extensive ground beds is avoided. By the use of zinc anodes, it is practical to provide protection to coated lines in cities and congested areas without introducing problems of interference to nearby structures.

Concerning the disadvantages of zinc as a current source in cathodic protection installations, perhaps the most important is the lack of information on the long-time performance of zinc in the various types of soil that are encountered. Zinc may not be applicable for use in locations where high soil resistivity limits the current output to small values. In some locations the constituents of the soil may result in the building up of high-resistance films which limit the current output to values below the requirements for protection of the lines.

The use of chemical materials in the soil adjacent the zinc anodes offers possibilities of reducing the tendency of the anodes to become passive where soil conditions are unfavorable.

Consideration is given to the character of corrosion products on zinc anodes buried in various types of soil, changes in film potential, effect of impurities in zinc anodes, local action currents from different soil strata, effect of current density on the behavior of zinc anodes and tests on zinc-protected lines of Colorado Interstate Gas Co.

## Coupling Bonding on Natural-Gas Pipe Lines

**F. J. McELHATTON, Panhandle Eastern Pipe Line Co.**

BECAUSE the major portion of natural-gas lines are constructed with mechanical couplings having rubber gaskets, in the application of cathodic protection it is necessary that the couplings be electrically bonded to make the pipe line a continuous structure providing a low resistance metallic path in the pipe for the dc current return.

The lowest resistances were obtained with a factory assembled bond. This type appears to be ideal for installation on existing pipe lines. A large quantity of this type of bond was secured recently at a very slight increase in cost over the types cut and assembled in company warehouses in the past.

On new construction, where couplings are used, a good, satisfactory, economical bond of extremely low resistance can be secured with the armored gasket if the necessary precautions are taken to see that all of the parts are clean.

## Economic Factors of the Corrosion Problem

**H. C. GEAR, Lone Star Gas Co.**

DIMINUTION in service life due to the selective and concentrated attack of corrosion causing mortalities of units of pipe and the need for repairs and replacements requires consideration of the behavior of a group of like property units installed at a given date and to the manner of interpreting this behavior from the standpoint of the investigator. Experience has shown that the renewal of property units of a group installation in a like environment will follow some definite trend or pattern with the rate of renewal reaching the maximum at the average life of the group.

## The Need for a Method for Detecting Internal Corrosion

**T. W. McGUIRE, Cotton Valley Operators Committee.**

WORK is being done on a tool for determining internal corrosion of tubing and initial field tests have been made. This is a mechanically operated device which is lowered into a well by a wire line and lubricator by a procedure similar to that of taking bottom hole pressures by a recording pressure gage.

## Somastic Pipe Coating and Cathodic Protection

**GORDON N. SCOTT, consulting engineer in charge of research and development, Industrial Engineering Co.**

IT is now entirely feasible, with one commercial coating at least, to cover hundreds of miles of a pipe line with a covering which has flaws so few and so scattered that it is essentially continuous, and likely to remain so for a long but an undetermined length of time.

A result of such a truly continuous and lasting coating is the use of less steel in pipe lines which, with a reasonable factor of safety, need be only as thick as the strength of the steel and the load imposed

on it would demand.

The practical requirements of design and certain structural deficiencies, such as failures in defective welds, tend occasionally to disrupt the continuity of the coating. Such deficiencies in the coating can often be repaired if known to exist and located or supplemented by cathodic protection so that the pipe-line operator may now look forward with confidence to a substantially leakless pipe line of long life.

The paper discusses some aspects of application of cathodic protection to Somastic.

## A Field Experiment With Magnesium Rods

**G. R. OLSON, Shreveport, La.**

TESTS seem to indicate that magnesium goes into solution much more rapidly than the theoretical value of about 8.7 lb. per ampere year. Other tests indicate that magnesium goes into solution very rapidly when buried in the ground even though not connected as a galvanic couple or with no current output. The author believes magnesium would have several advantages over zinc, particularly in higher-resistance soils if a method can be found to reduce the weight loss per ampere year to a value approaching the theoretical.

## Experience in Use of Pearson Electronic Coating Inspector

**L. A. HUGO, Phillips Petroleum Co.**

IN testing 150 miles of asphalt coating and 45 miles of coal-tar enamel with bonded wrap of 15-lb. asbestos felt with the use of an instrument described by Dr. J. M. Pearson, "Electronic Examination of Coating on Buried Lines," January 31, 1941, a determination was made of results to be obtained by such equipment.

At the 80 points where positive signals were obtained, 11 inspection holes were dug; at five of these actual injuries to the coating were found; at the remaining six points no defects could be detected visually but it was possible that imperfections of some type exist in these areas. In future tests, arrangements will be made at inspection points for coating conductance tests and the application of a conventional holiday detector to determine whether the electronic inspector will respond where no fault in the coating exists.

## Design and Construction of Tap-Changing Transformers For Cathodic Protection

**E. G. GODDARD, Jefferson Electric Co.**

FOR cathodic protection direct current may be obtained most readily by using a bridge-type rectifier of the dry-disk type and a transformer for reducing the line voltage to the correct voltage desired for the rectifier. Since railroad signaling circuits are similar to those employed for cathodic protection, the equipment and service of railroad equipment for signaling was discussed.

## Problems of Pulsating Currents

**BETHEL BOND, Texas Pipe Line Co.**

IN dealing with pulsating and alternating currents a number of problems have arisen in connection with direct current from rectifiers, direct and alternating currents combined as well as with alternating currents.

Valuable information may come from laboratory experimentation but proper instruments for field investigations are not obtainable. While d.c. millivoltmeters are common, a.c. millivoltmeters are not made for general use. The only commercial instrument of any real value is the oscillograph. This instrument gives direct indications of pulsating voltages, and the nature of such pulsations. It is limited to a minimum voltage required to register on the instrument. For smaller potentials, an a.c. millivoltmeter is desirable. At present the investigator must construct his own instrument.

The whole problem of pulsating currents as regards electrolytic corrosion is one about which little is known from a practical standpoint.

## A Proposed Method for Remote Indication of Cathodic Protection Unit Outages

**HENRY P. GRIGGS**

TO reduce the length of cathodic protection unit outages as well as the frequency of necessary inspections experiments have been conducted with an electrical device which could be installed along with the cathodic protection unit to send a signal to the central location so that an observer will know whenever the unit becomes inoperative.

The component parts of such an electrical device are: a tuned oscillator to generate a signal; a company-owned and operated telephone line to carry the generated signal, and a tuned receiver to pick up the generated signal at the central location.

## Estimates of Corrosion Rates By Chemical Analysis

**E. A. BROWN, Lone Star Producing Co.**

CHEMICAL tests have limitations, but also definite values, in attempting to estimate corrosion rates. Lone Star Producing Co.'s experience indicates that most of the iron removed from the internal surfaces of the pipe and fittings remains in true solution in the produced water and, therefore, is readily available for chemical determination. The amount of iron produced with the connate water from the reservoir is not known accurately, but two tests of bottom-hole water have indicated that iron content of the connate water does not exceed 5 p.p.m. in the water samples obtained at the well head. If iron from this source is eliminated, then all the iron in the inlet separator water must have been removed from the steel equipment on the job and this amount of iron may be readily calculated from a knowledge of the volume of water drained from the separator and the concentration of iron in this water.

## Uses of Clad Steel to Combat Corrosion

**MARTIN J. CONWAY, Manager, Petroleum Division, Lukens Steel Co.**

DEVELOPMENT of clad steels was the outcome of a desire to provide an economical thickness of corrosion-resistant metals, as compared with solid material of similar analysis, which could be used in fabrication which would contribute to a lower finished cost without sacrifice of structural strength.

Among the many typical uses for clad plates are: Distillation towers, heat exchangers, agitators, storage tanks, digestors, as well as for other services in the petroleum industry, and in the synthetic-rubber, explosive manufacturing, and chemical industries.

## Application of Nickel Containing Corrosion-Resistant Alloys In the Petroleum Industry

**B. B. MORTON, The International Nickel Co., Inc.**

APPLICATION of nickel alloys to solution of corrosion problems is discussed. The problems arise from attack by sulfur, naphthenic acid, electrolysis, hydrochloric acid, sulfuric acid, hydrofluoric acid, phosphoric acid, as well as those connected with the use of solvents and caustic regeneration in refining. Attention is also directed to use of such alloys in drill pipe, sucker rods and pump equipment.

## CORROSION ENGINEERS ELECT NEW OFFICERS

*These men, chosen at the recent conference in Houston, will head National Association of Corrosion Engineers during the ensuing year: G. R. Olson, United Gas Pipe Line Co., director; F. J. McElhatton, Panhandle Eastern Pipe Line Co., vice president; R. A. Brannon, Humble Pipe Line Co., president; O. C. Mudd, Shell Pipe Line Co., secretary-treasurer; Lyle R. Sheppard, Interstate Natural Gas Co., director*

SPANG

# QUESTIONS on TECHNOLOGY

*by W. L. Nelson*

**This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in the various phases of plant operation; also those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Questions should be submitted in as much detail as possible. Inquiries must be signed, but only the given initials will be printed. The source of the question is considered to be confidential. Questions requiring a discussion of patents, extended computations, or a detailed study cannot be considered. When the matter is of general interest, a reply will be published within a reasonable time.**

## Pressure Drop in Condenser Box Headers

**Condenser-box headers are a source of pressure drop and were not even mentioned by you in your question of March 30, 1944. Aren't header-pressure drops important?—H. C. B.**

The pressure drop through a vapor header may be almost as much as the drop in the vapor lines. The header-pressure drop was not ignored but was dismissed because it was somewhat complicated. Complications arise because so many combinations of numbers and sizes of branch lines have been used.

Headers are commonly designed so that the velocity in each of the branches is the same as in the main line leading to the leader. The number of branches in such header systems is indicated in Table 1.

**TABLE 1—CONDENSER BOX HEADERS**
**(Velocity in Branches Same as in Inlet Vapor Line)**

| Size of header and inlet line | Number of branches | | | |
|---|---|---|---|---|
| | 2-in. | 3-in. | 4-in. | 6-in. |
| 6-in. | 10 (9) | 4 | 2 (3) | .. |
| 8-in. | 16 (15) | 8 (7) | 4 | 2 |
| 10-in. | .. | 12 (11) | 6 | 4 (3) |
| 12-in. | .. | 16 (15) | 10 (9) | 4 |
| 16-in. | .. | 28 (27) | 16 | 8 (7) |

The main friction losses occur at the tee by which the vapor line is connected to the header, and the contraction of the gas into each of the branch lines. Scarcely any loss in pressure occurs by the flow of gas along the header and such friction loss merely results in a slightly higher velocity in the branches that are situated close to the entrance than in those near the end of the header.

Approximate pressure drops through topping plant condenser box headers are shown in Table 2. The pressure drops were computed for the following conditions: 59 A.P.I. gasoline; temperature, 300° F.; average pressure, 18 lb. per sq. in. absolute.

**TABLE 2—APPROXIMATE PRESSURE DROPS THROUGH HEADER BOXES IN TOPPING PLANT CONDENSERS**

| Header size | Inlet and branch velocity | | | |
|---|---|---|---|---|
| | 50 ft./sec. | 100 ft./sec. | 150 ft./sec. | 200 ft./sec. |
| 6-in. | .07-.1 | .3 -.4 | .7 -.9 | 1.2 -1.6 |
| 8-in. | .07-.1 | .29-.4 | .65-.9 | 1.16-1.6 |
| 10-in. | .07-.1 | .28-.38 | .63-.85 | 1.12-1.5 |
| 12-in. | .06-.09 | .26-.35 | .6 -.8 | 1.04-1.4 |
| 16-in. | .06-.08 | .24-.30 | .54-.68 | .96-1.2 |

In connection with Table 2, it is interesting to note that the pressure drop is not greatly affected by the size of branches employed.

The back pressures caused by 200 (equivalent) feet of vapor line connected to headers such as those shown in Table 1 are about as shown in Table 3. Unfortunately, the single largest source of back pressure in a condenser box cannot be presented in a simple table form. The largest pressure drop occurs in the coils of the condenser box, and is a function of the heat transfer rate, cleanliness of the condensing surface, etc.

**TABLE 3—APPROXIMATE PRESSURE DROP THROUGH VAPOR LINES AND HEADERS**

**(Using 200 Equivalent Feet Length of Vapor Line)**

| Size of vapor line and header | Velocity in vapor line and in branches of header | | |
|---|---|---|---|
| | 50 ft./sec. | 100 ft./sec. | 150 ft./sec. |
| 6-in. | 0.5 | 1.96 | 4.4 |
| 8-in. | 0.4 | 1.6 | 3.5 |
| 10-in. | 0.34 | 1.3 | 2.9 |
| 12-in. | 0.29 | 1.1 | 2.5 |
| 16-in. | 0.24 | .9 | 1.9 |

## Numerous Octane Number Methods—Correction

Note: In the item of same title, dated January 27, the relationship between octane numbers by the research and motor methods was wrong. Octane numbers by the research method are higher than by the motor method but cracked materials exhibit research octane numbers about 10 units higher than by the motor method, whereas the research octane numbers of straightrun stocks are scarcely higher than by the motor method.

A good recent comparison of octane numbers by the motor and research methods is that of T. H. Risk, "Antiknock Performance of Postwar Gasolines," National Petroleum News, page R-132, March 1, 1944. Octane numbers are given as follows:

| | A.S.T.M. motor | C.F.R. research | Increase |
|---|---|---|---|
| Straightrun | 55 | 55 | 0 |
| Natural gasoline | 65 | 65 | 0 |
| Thermal cracked and reformed | 70 | 80 | 10 |
| Polymer | 80 | 92-95 | 12-15 |
| Catalytic cracked | 78-80 | 90-92 | 10-14 |
| Aromatic— | | | |
| Hydroformed | 80 | 90-92 | 10-12 |
| Cycloversion | 80 | 92-94 | 12-14 |
| Isomerized straightrun | 70-75 | 70-75 | 0 |
| Alkylate and hydrocodimer | 90 | 90-92 | 0-2 |

Although the research method and 3-C (rich mixture) methods are mechanically very different, they both are used in evaluating the ability of fuels to develop great power during start up, takeoff in the case of aircraft (3-C) and urban start-and-stop driving (research) in the case of automotive engines. Cruising operations of aircraft are best correlated by the 1-C method, just as detonation in cross-country automotive operation can be judged better from A.S.T.M. octane numbers than by research octane numbers.

# PORTABLE RECIPROCATING-TYPE GAS-COMPRESSOR UNITS

THE Appalachian area is profuse with small productive lenses or formations and individual wells where the sand pressure has declined to a point where little or no production is obtained with the prevailing line pressures. In these small low-pressure areas the installation and operation of small portable compressor units would enable marketing the gas.

The most suitable type of portable compressor unit is largely a matter of preference. The feature most desirable is the greatest compressor horsepower for a given weight. Rugged construction lessens maintenance and a well-balanced, compact unit makes easier handling. A completely enclosed water system with radiator and fan cooling is adaptable to the use of antifreeze for winter operation. Comparatively slow-speed powers require less maintenance; bypasses in the water circulating system tend to keep even temperatures; and large fans require less horsepower. The automatic controls required depend on the amount of attendance expected.

The quantity of gas to be pumped and the operating pressures determine the size unit to install. Fig. 1 shows the brake horsepower required to compress 1,000,000 cu. ft. of gas a day for various operating pressures. This chart can be used to determine, with reasonable accuracy, the size compressor unit for a specific job. It might be advisable to install a larger unit than is required at the initial stages of operation to make provisions for future operating conditions. In the case of multicylinder powers with V-belt-driven compressors, the compressor horsepower available should not be considered much over 50 per cent of the rated horsepower of the engine. It is good practice to operate a unit under its rated capacity in order to keep maintenance at a minimum.

Complete gas compressor units approaching 100 brake horsepower capacity, and which are easily portable, are available. Original installation costs of a unit will vary according to the permanence or elaborateness of the installation. For temporary locations, timbers can be used for foundations, sectional buildings erected and all piping fitted for easy salvage. Upon removal to another location, practically all material can be salvaged and the chief loss would be the labor. The original cost of such an installation should not exceed $75 or $80 per brake horsepower. This compares with a cost of $100 to $120 per brake horsepower for larger permanent compressor-station installations.

All prospective users of these small compressor units are interested in the cost of operation, or the cost of recovering gas. There are so many variable factors involved in operation that until all the conditions are known, no reliable estimate of cost can be made. The first consideration is the total amount of gas which can be recovered and the rate at which it can be taken. The compression ratio is the governing factor in the quantity of gas pumped and consequently the cost. The same size unit (in horsepower) may compress a rate varying from 500,000 to 2,500,000 cu. ft. a day depending on the operating pressures. The cost per thousand cubic feet would vary accordingly. Other factors which would influence the cost are the price of fuel gas and the rate and amount of labor used in operation.

Actual cost records for the various operating conditions have not been obtained but with a unit which develops about 75 brake horsepower and pumps somewhat over 1,000,000 cu. ft. a day the cost of operation should not be much over 1 cent per 1,000 cu. ft. Cost of compression with the portable unit will follow the same general pattern as with permanent compressor stations. The rate may vary from about 2 cents per 1,000 cu. ft. in field stations with a high compression ratio to less than ½ cent in transmission stations with a low compression ratio.

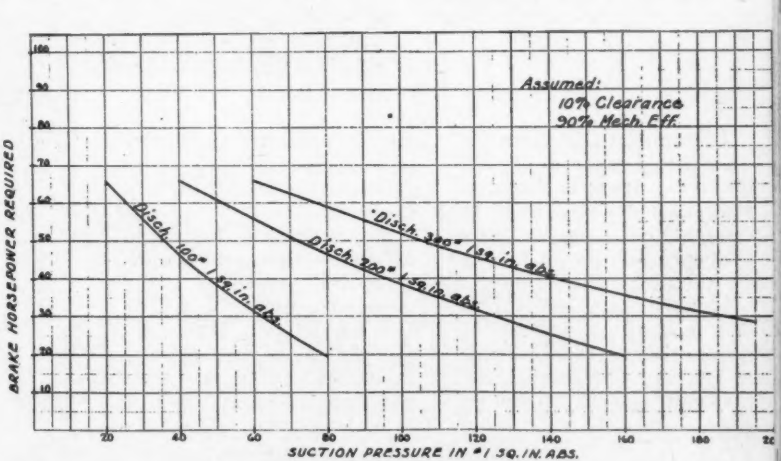
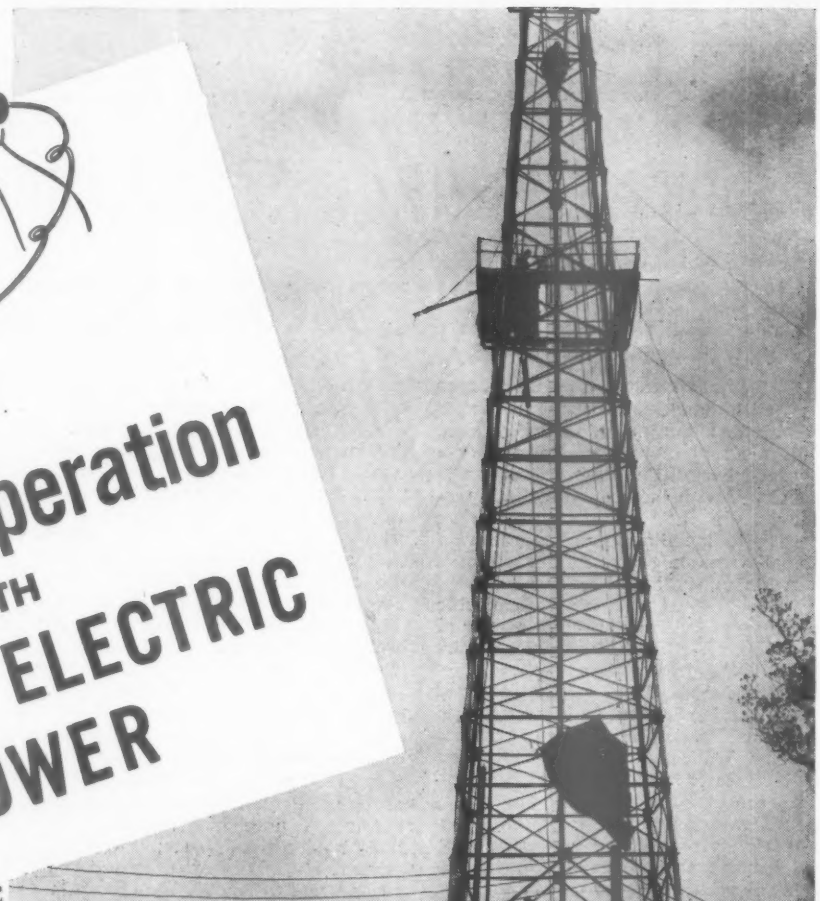



*Fig. 1: Brake horsepower required to compress 1,000,000 cu. ft. of dry natural gas a day for various suction pressures with discharge pressures of 100 lb. absolute, 200 lb. absolute and 300 lb. absolute*

**This installment of Cost Engineering is an abstract of a paper presented at the meeting this month of the Eastern District, American Petroleum Institute, Division of Production, at Columbus, Ohio. The paper was presented by Paul E. Dufendach, of Kentucky-West Virginia Gas Co.**

# Smooth Operation WITH UTILITY ELECTRIC POWER



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# CHEMICAL NATURE OF MUD

ORDINARY rotary drilling fluid is composed of a liquid phase (water) in which solid material is suspended, and in which additional chemical compounds may be carried in solution. A large proportion of the solid material carried in a good drilling fluid is in the form of very fine colloidal clay particles. Larger inert particles may be present in varying proportions depending upon the type of formations drilled and also upon the chemical and physical properties of the drilling fluid. Organic or inorganic compounds in solution in the water phase have a direct bearing upon the behavior of the colloidal suspension.

The clay in most drilling fluids is predominantly bentonitic; hence, this discussion will be confined principally to a consideration of the properties of suspensions of bentonitic clay in water.

Chemically, bentonite is a complex hydrated aluminum silicate. Evidence indicates that bentonite particles have a micaceous (plate-like) structure. The flat surfaces of these plates represent natural cleavage planes of the bentonite, indicating that the surfaces are chemically saturated and, for this reason, do not exert strong molecular attraction on adjacent plates. On the other hand, the edges of these plates (transverse or perpendicular to the flat surfaces) represent fracture surfaces across the continuous crystal lattice. At these fracture surfaces, there are unsatisfied valence bonds that, before the fracture, served to hold a larger sheet together. These broken-bond valences exhibit relatively strong attractive forces, as compared to the weak electrostatic forces which cause slight mutual attraction between the flat surfaces of adjacent particles.

The mutual attraction between the flat surfaces of adjacent particles is so weak that water may enter along such a plane, be absorbed to the surfaces and pry adjacent sheets apart. Water adsorbed in this manner is termed planar water, and is accepted as the cause of the swelling of bentonite in water. The weak electrostatic forces on the surfaces are thus satisfied by adsorbed water, which may nullify the mutual attraction between the plane surfaces of adjacent particles. The electrostatic forces which attract water increase with increasing ionization of the clay particles. Then, with a greater degree of ionization a greater amount of water is bound to the plane surfaces and the stability of the hydrated clay is greater. The degree of ionization for some common colloidal clay salts decrease in the order: lithium, sodium, potassium, ammonium, magnesium, calcium, barium, hydrogen.

The order just listed indicates that hydrogen is more tenaciously attached to the clay sheets (anions) than any of the metal ions listed, or in other words exhibits the lowest degree of ionization. Since sodium ionizes to a much greater degree, it leaves a much larger number of unsatisfied negative charges on the clay particle. This higher negative charge causes a greater mutual repulsion between particles, which prevents the formation of aggregates, that is, keeps the particles dispersed more completely in the liquid phase of the suspension.

It might be expected from this effect alone that a sodium bentonite should yield a suspension of lower viscosity than a calcium bentonite of the same concentration; but this is not the case because of the higher degree of hydration of the sodium bentonite. Sodium bentonite is more desirable in drilling fluids than are the alkaline earth clays, such as calcium bentonite, because the sodium bentonite makes a more readily dispersed and more stable suspension when mixed with water.

### Gel Strength

The gelling of bentonitic mud* can be attributed to the mutual attraction between the transverse fracture surfaces (edges) of adjacent particles. The broken-bond valences at these surfaces are satisfied in part by the adsorption of water, but there remains a relatively strong attractive force tending to pull adjacent clay particles together and form a continuous clay sheet. This action increases the friction between the particles as evidenced by the increased resistance of the suspension to movement after a period of quiescence. When the suspension is agitated in any way the particles are thrown out of their definite pattern so that less resistance to slip is exhibited. A greater degree of agitation will cause more complete destruction of the oriented pattern of the particles and thus a lower strength of gel.

*See Installments 123 and 124.

### Gel Rate

As already indicated, gelling is attributed to the strong attractive forces between broken bonds of adjacent clay particles. The chances of a particle moving into such a position as to become attached to another particle are increased by: (1) increasing the temperature, (2) increasing the number of particles, (3) decreasing the repulsive electric charges on the clay sheets. This explains why a mud exhibits a higher apparent viscosity (predominantly a higher rate of gelling) when the property is measured by ordinary methods. It has also been observed that smaller particle sizes promote a higher gel rate, and the effect of most chemicals used for reducing gel rate can be attributed to either an adsorption of the repulsive negative charges on the clay sheet or to a temporary blocking (possibly by protective films) of the broken-bond attractive forces on the edges of the clay sheets.

Garrison reports an increase in the ultimate gel strength of a bentonitic mud with increasing pH. He also reports a decrease in gel rate as the pH is increased to about 10, and then an increase in gel rate at higher pH values. He points out that ultimate gel strength is higher when there is a greater number of particles in a suspension. Then, the use of sodium hydroxide to increase pH value may be expected to result in an increased ultimate gel strength because the particles are more completely dispersed and smaller than before hydrogen ions were replaced on the clay sheet by sodium ions. The gel rate decreases and then increases with increasing pH because, although there are more particles to gel, there is some critical value of pH at which the maximum electric charge and thick layers of adsorbed broken-bond water will retard the attachments.

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Garrison, "Surface Chemistry of Clays and Shales," A.I.M.E. Pet. Dev. and Tech., 1939, pp. 191-204.

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Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

IXO

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# Many Factors to Consider in Gasoline-Plant Projects

*by W. F. Matheny**

A procedure is presented for analyzing long-range operating and economic factors involved in planning for a natural-gasoline plant in connection with a pressure-maintenance program for an oil-producing area. Except for proration, wage, and price considerations, guess work has been largely removed, now that there are no longer any important facts regarding plant design which are not generally known by operating organizations. This article is a slightly abridged version of a paper presented at the meeting April 12-14, of the Natural Gasoline Association of America, at Dallas.

BASICALLY natural gasoline is still a salvage industry. As a general proposition we still gather the casinghead gas that is produced along with oil, and by the collection and stripping of this gas, returning to the leases residue gas over those periods when the wells are not flowing or pumping—we, in addition to paying for the gas, perform a service for the producers which they would individually find uneconomic or very inconvenient. However, even this salvage operation is now-a-days run on a very scientific and business-like basis. Among the very many factors which must be considered before any gasoline manufacturer can ask his management to invest substantial sums of money in a gasoline plant are:

The areal extent of the producing horizon, well spacing, thickness, porosity, and permeability of the producing sand, reservoir temperatures and pressures, reserves of both gas and oil in place, gasoline content of the gas, nitrogen, carbon dioxide and hydrogen sulfide content of the gas—not only at the time the plant is built but a prophecy for every year of the field's life. So far all these factors named lend themselves to fairly accurate determination.

However, the real variables that make or break a gasoline-plant situation do not lie within the gasoline manufacturers' control—but must be fixed by the producers, and the regulatory bodies who in turn establish certain basic premises. I now refer to such things as allowables per well, whether the wells will be "stop-cocked" and the day's or week's allowable produced in a few hours, possibilities of pressure maintenance and if such a program is to be followed, what per cent of the produced gas is to be injected into the sand, at what stages of depletion pressure maintenance is to be started, and possibilities of gas lifting in the final stages of natural flow are very vital factors to the gasoline manufacturers. Also these producing methods in turn dictate the utilization of the residue gas and establish whether the plant operator can depend on some revenue from the sale of gas to help amortize his investment. Speculations as to prices of his products over the life of the project, the effect of income taxes on the earnings, and labor costs of the future must all be weighed into the melting pot from which the plant emerges. The southwestern oil fields are covered with vacant foundations which stand as monuments to the lack of those analyses or to the bad guesses of answers to some of the above questions.

To point up the discussion and lend specificity to the data, we can set up a hypothetical reservoir and field, to which can be assigned reasonable characteristics and to which can be applied reasonable technology and economics. In this manner, we shall establish not only the mental mechanics necessary to the solution of a typical problem but we shall also lend a measure of perspective which may add value to the data. Data and derivations herein are purely illustrative, presented only to show one manufacturer's approach in determining the prospects of a sound venture, and followed by typical speculation as to the more important variables upon which any profitability is pitched.

### Under Development 1 Year

For our purpose we shall simplify the presentation by assuming that the hypothetical field in question has been under development for 1 year, that its characteristics are already fairly well described, and that it is desired to begin gasoline-plant operation at the end of the second year. The prospective plant operator evaluating the situation would have before

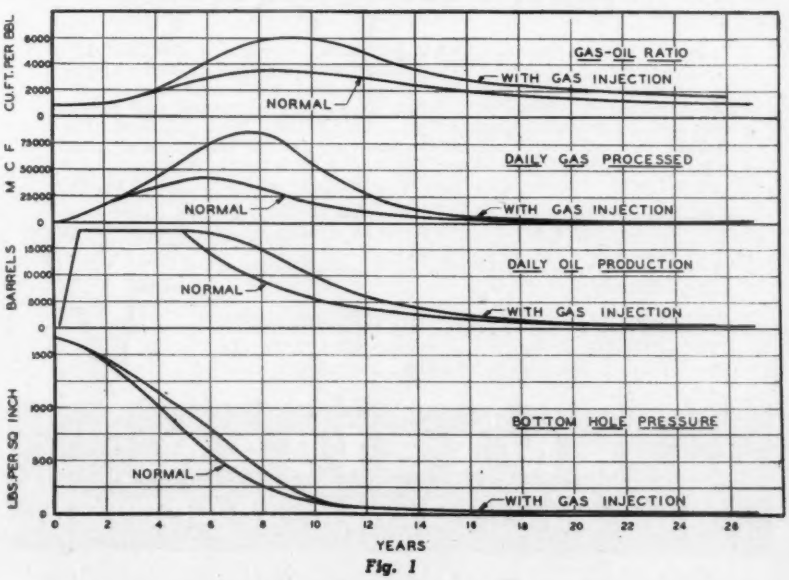


*Fig. 1*

*Phillips Petroleum Co.

him information such as the following on the field and reservoir and he would note the effect of the accuracy of such data on the eventual success of a gasoline plant venture about as indicated.

The field is described as having 5,120 acres of proven production from a reservoir with an average sand thickness of 50 ft. and an initial pressure of 1,600 lb. Core data indicate about 20 per cent porosity and a connate water content of about 20 per cent. These facts would indicate over 300,000,000 bbl. of total hydrocarbon content but would not fully describe a gas-oil contact and could not be used to predict future field performance. Obviously, any inaccuracy in areal extent of the field, or pore volume would be directly reflected in the calculated total reserves.

Supplementing the sand-volume data is the more pointed and useful information on the gas solubility and shrinkage characteristics of the reservoir oil, the produced oil and gas volumes and coincident bottom-hole pressures at various times since first production, and the deviation of reservoir gas from Boyles law under reservoir conditions of temperature and pressure. For our example these data will show the reservoir to have initially contained 200,000,000 bbl. of "residual" or "stock tank" oil and 125,000,000,000 cu. ft. of gas. They will further indicate that no appreciable water drive exists and that a gas cap equal to 2 per cent of the pore space initially existed. Considered in light of the sand-volume data this information would sound reasonable and could be used in prediction of reservoir performance. However, since the data reflect only a short period of operation, the presence or effectiveness of a water drive is by no means certain and future oil and gas production schedules must be considered only as estimates subject to later checking and revision.

Table 1 represents a composite of several low-temperature fractional analyses of the reservoir gas and liquid during the first year of field production. At the conditions of sampling they indicate a saturated crude and by flash vaporization of reservoir liquid at bottom-hole temperature the above quoted gas reserve of 125,000,000,000 cu. ft. is corroborated.

**TABLE 1**

| | Reservoir gas mol % | Reservoir liquid mol % |
|---|---|---|
| Methane | 83.87 | 26.00 |
| Ethane | 9.26 | 9.07 |
| Propane | 4.00 | 7.55 |
| Isobutane | 0.50 | 1.60 |
| Normal butane | 1.20 | 4.52 |
| Pentanes | 0.53 | 3.84 |
| Hexanes and heavier | 0.64 | 47.42 |
| | 100.00 | 100.00 |

Bottom-hole pressure = 1,600 lb. per sq. in.
Bottom-hole temperature = 147° F.
Molecular weight of hexanes and heavier fraction of reservoir liquid = 205
$H_2S$ content of separator gas = 400 grains per 100 cu. ft.

After determining that the reservoir and field development data are reasonably in accord, a forecast of the field operation under alternative production programs is permissible. Historically, natural-gasoline-plant operations have always been secondary in importance to oil production and the alternative programs available to use for study are no exception to the rule. We shall assume that the producers in our hypothetical field have elected a pressure-maintenance program employing injection of 50 per cent of the produced gas. Our problem is to analyze these alternative projects from the plant operator's standpoint to forecast the facilities and investment required during the life of the field and to estimate the costs of operation and return on the money invested.

The basic predictions of gas volume and composition which are required for plant design entail, of course, certain important premises of reservoir and field operation. Our figures reflect that:

1. No water drive exists in the reservoir so that the only factors affecting the producing gas-oil ratio under efficient field operation are those of

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expansion and vaporization of the reservoir fluids.

2. Construction will be completed and plant operation can begin at the end of the second year of the field life.

3. A 69-bbl.-per-well allowable will be effective during the prorated life of the field. (A bad guess here can put you into bankruptcy).

| | Daily gas vol. | 26-70 Gasoline in gas |
|---|---|---|
| With 50 per cent gas injection—Peak gas load 8th year | 85,000 M.c.f. | 98,000 gal. |
| Without gas injection—Peak gas load 6th year | 42,300 M.c.f. | 72,400 gal. |
| Difference | 42,700 M.c.f. | 25,600 gal. |
| Per cent increase | 100% | 35.3% |
| | **Ultimate gas vol.** | **Ultimate 26-70** |
| With 50 per cent gas injection—Complete life of plant | 233,890 M.²c.f. | 294,544,000 |
| Without gas injection—Complete life of plant | 115,942 M.²c.f. | 256,967,000 |
| Difference | 117,948 M.²c.f. | 37,577,000 gal. |
| Per cent increase | 100% | 15% |

4. Field separators will operate at 5-lb. gage pressure and the plant intake pressure will be atmospheric.

5. Production of oil and gas will be divided equally among all producing wells.

Fig. 1, based on an application of the accumulated physical data and the foregoing supplementary premises, is a composite of several curves showing comparative operating data over the life of the project. Future gas-oil ratios were determined from a simultaneous solution of material balance equations and the radial flow equations, using a relative permeability versus per cent saturation curve. Viscosity characteristics of the crude may be obtained experimentally in the laboratory. Viscosity of the gas is estimated, in this instance, along the lines set out by Sage and Lacey. Solubility and shrinkage data must be determined experimentally. The solution used was a trial and error method, using several pressure intervals until the reservoir is at 0 lb. per sq. in. abs. Note that the producing gas-oil ratio passes through a maximum under both the normal depletion and gas-injection programs and that gas injection both accentuates and displaces this maximum. Note also that the maximum daily volume of separator gas for processing is increased under the injection program to 85,000,000 cu. ft as compared to 40,000,000 under normal operation. Here, if one pauses for a quick overall look at the effects on the project from his assumption of 50 per cent reinjected gas he will find:

Observe here that the first two curves of Fig. 1, along with the assumed allowable per well, not only dictate the investment required, but the year in which it is to be made. The prudent operator derives a family of such curves based on more than one assumption as to allowables, per cent of gas reinjected, and the stage of depletion at which pressure maintenance might be started. Then from past experience with respect to operating practices of the producers involved, the past policies of the controlling regulatory bodies, and his own judgment—the plant and gathering lines are set up providing capacity for the immediate future, but with predetermined ideas as to future expansions. For our example, the plant would start operations with only 2,960 installed horsepower and one 1,350,000-gal. distillation unit, though the plant layout would be adequate for 11,400 hp. and four such distillation units. It is probable that all plant headers would, at the outset, be sized for the ultimate peak load with the attendant investment burden the first few years, but with future financial savings in both construction cost and shutdown time.

Although not essential to the solution of our problems, Fig. 2 is presented to show the general effect of pressure maintenance on oil production. The data are typical in showing an increasing monthly production during the development period before gas injection begins, a restricted maximum under proration and a decline period during which allowables can no longer be met. The calculations in this instance, based on a termination of natural flow at a bottom-hole pressure of 600 lb., indicate that the 50 per cent recycle gas injection program extends the natural flow period by 1.2 years during which time 7,000,000 bbl. of oil is produced. Ultimate oil recovery is increased by 20 per cent or from 60,000,000 to 72,000,000 bbl. by 50 per cent gas injection.

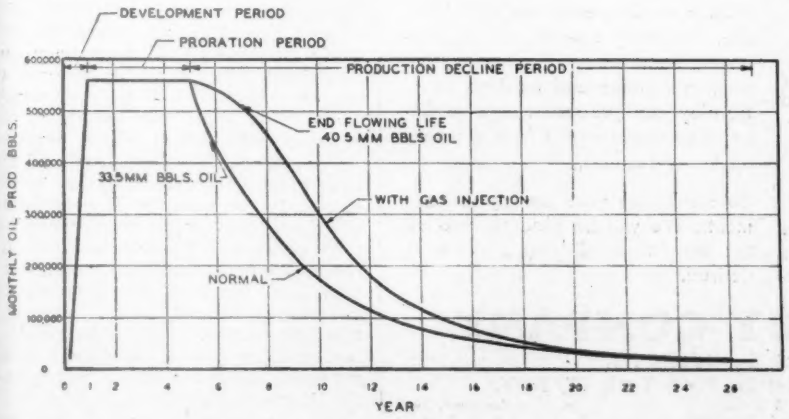


Fig. 2

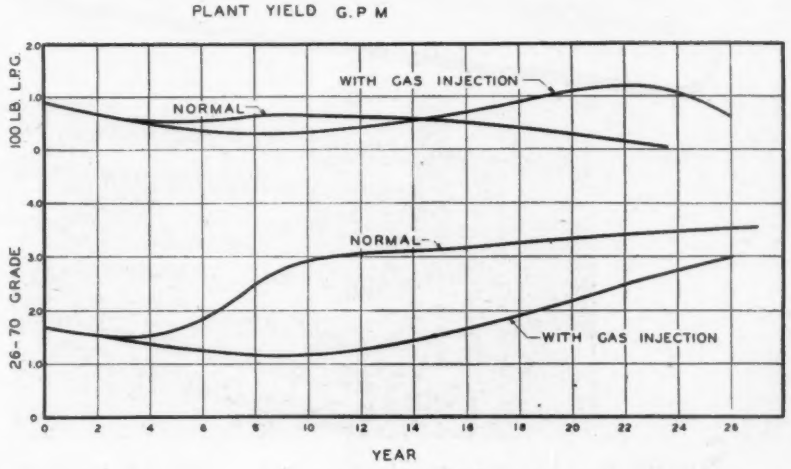


Fig. 3

Of greater importance to the problem at hand are the data of Fig. 3 which show the estimated plant yields of 26-70 grade natural gasoline and liquefied petroleum gas. The dilution effect of increased gas production is readily discernible in the low-

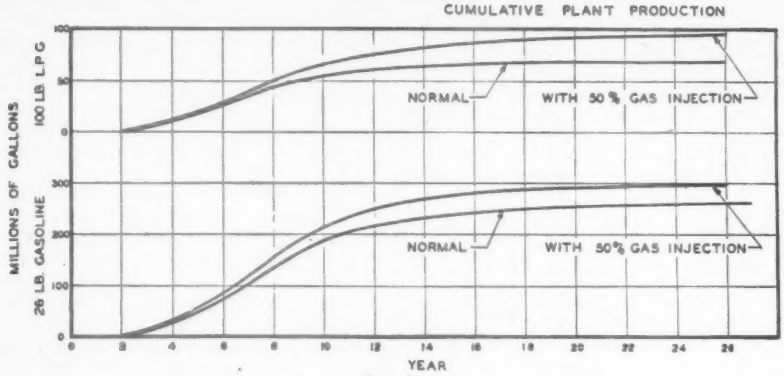


*Fig. 4*


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er 26-70 content under the injection program. The yield of liquefied petroleum gas, here estimated as the excess butane above 26-70 requirement resulting from 70 per cent butane recovery plus sufficient propane to make 100-lb. vapor pressure product, is at first lowered by the dilution effect of injected gas but is maintained after normal operation can no longer produce sufficient butane for 26-70 requirements.

Application of the yield data of Fig. 3 to the separator gas volumes shown in Fig. 1 develops the cumulative plant production data shown on Fig. 4. The 50 per cent gas injection program increases 26-70 production 37,577,000 gal. and increases l.p.g. by 26,193,000 gal. Examination will show that injection is quite ineffective in increasing natural gasoline production until the reservoir pressure has dropped to less than 500 lb. per sq. in. and enrichment of the recycle gas becomes appreciable. The physical characteristics of the commingled injected residue gas and the reservoir oil at high pressures do not give the gas, on separation from the oil, many of the pentane plus fractions which make gasoline. At lower pressures, such as would be experienced after the tenth year, the above would not be the case. Methane from the injected gas would go into solution with the crude oil to make up its existing vapor pressure and in turn "kick out" of the oil some of the fractions which make natural gasoline. This characteristic is shown clearly on the g.p.m. curve.

During the period of early injection with high bottom-hole pressure and increasing ratios, the 26-lb. g.p.m. will be driven down perceptibly. The content makes its recovery only when the ratios have diminished, the bottom-hole pressure is sufficiently low for the exchange in hydrocarbons between the injected gas and the oil contacted, and the richer gas being evolved from the oil in place at the lower bottom-hole pressure. Unfortunately, when the reservoir pressure has declined to the extent that injected gas would be enriched with natural gasoline hydrocarbons, the pool's gas reserve will have been dissipated and the available volume of gas for injection will be very small. Thus it is quite obvious that the stage of depletion at which pressure maintenance might be started and the percentage of produced gas to be returned to the sand, have a profound effect on the gasoline plant situation.

In addition to forecasts of field and reservoir performance, management must have before it the requirements of equipment and capital expenditure necessary to obtain the production and income. What benefit is an extensive operation and large production if operation costs and taxes preclude a reasonable profit to the enterprise? The elements of difference

SPECIAL SECTION ON WORLD'S DEEPEST WELL STARTS NEXT PAGE

in equipment and operation must be reviewed in order to determine the respective investments required and the return to be expected.

**TABLE 2—SUMMARY OF COMPRESSOR HORSEPOWER REQUIREMENTS***

| Year | Field engines for normal reservoir depletion program | Field engines for 50-lb. plant when employing gas injection |
|---|---|---|
| 3 | 2,780 | 2,960 |
| 4 | 3,720 | 4,340 |
| 5 | 4,950 | 6,520 |
| 6 | 5,700 | 8,800 |
| 7 | 5,400 | 10,700 |
| 8 | 4,710 | 11,400 |
| 9 | 3,880 | 11,000 |
| 10 | 2,910 | 8,730 |
| 11 | 2,160 | 6,600 |
| 12 | 1,640 | 4,620 |
| 13 | 1,220 | 2,910 |
| 14 | 935 | 2,240 |
| 15 | 715 | 1,580 |
| 16 | 567 | 1,115 |
| 17 | 447 | 804 |
| 18 | 357 | 585 |
| 19 | 284 | 470 |
| 20 | 233 | 382 |
| 21 | 193 | 318 |
| 22 | .... | 280 |
| 23 | .... | 211 |

*Based on 75 per cent load factor.

Table 2 summarizes the horsepower requirements for field gas compression during the probable economic life of the project. Both the temporarily large gas volumes and the low load factor characteristic of the premised operations are effective in making the engine horsepower high. The summary as shown depicts a best estimate of rigorous adherence to the problem premises as set up for study in that it provides for handling of all of the produced gas from 5-lb. pressure separators in order that the 26-70 and L.P.G. which have been considered as available from the total gas may be produced. Actually, the high peak volumes are of such short duration that it may not be profitable to install the necessary horsepower to handle all of the gas.

In estimating engine requirements it would, of course, be highly desirable to reflect some satisfactory agreement between producers and the plant operator with respect to an even hourly and daily flowing schedule. Even though the volumes be large and the gas be rich with gasoline, if production is limited to the daylight hours or to the minimum days at the first of each month necessary to make the oil allowable, there is no profit in the gasoline-plant operation. The horsepower specified in Table 2 is based on an operating load factor of 75 per cent which appears at first glance to be low but which has in fact been repeatedly exhibited by actual operation. Table 3 reports actual load factors from 77 to 85 per cent based on the average peaks indicated by 24 and 48-hour meter chart volumes. Hourly load factors would, of course, be lower.

**TABLE 3—COMPRESSOR LOAD FACTORS**

| | 1944 | |
|---|---|---|
| Mankins plant (K.M.A.): | Jan. | Feb. |
| Daily average gas (M.c.f.) | 14,559 | 17,033 |
| Peak recorded gas (M.c.f.) | 18,292 | 20,072 |
| Apparent load factor* .... | 79.5% | 85% |
| Goldsmith plant: | | |
| Daily average gas (M.c.f.) | 45,941 | 48,530 |
| Peak recorded gas (M.c.f.) | 59,452 | 63,105 |
| Apparent load factor† .... | 77.3% | 76.9% |

*Actual load factor is lower since peak recorded gas is based on average of a 48-hour chart reading. †Actual load factor is lower since peak recorded gas is based on average of a 24-hour chart reading.

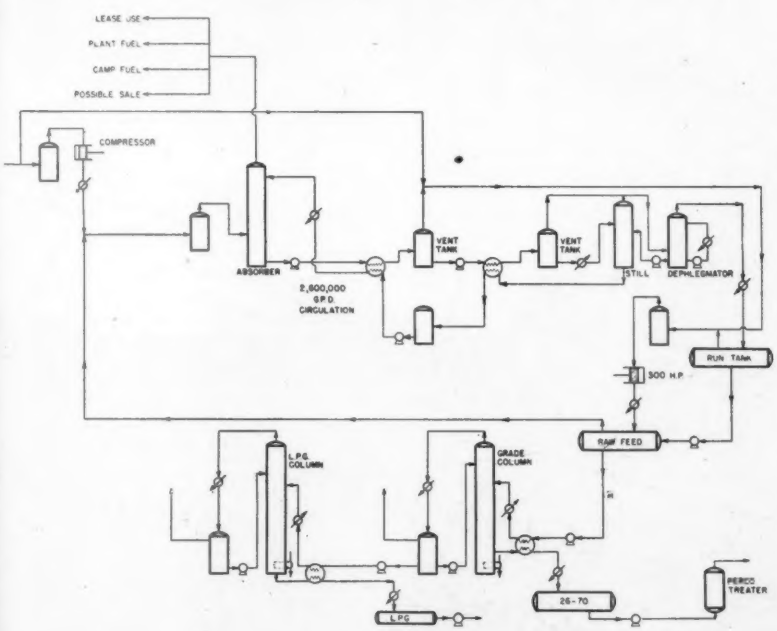



*Fig. 5*

The natural-gasoline production is fractionated and treated to produce a 26-70 grade product and 100-lb. vapor pressure butane-propane mixture. Such residue as is needed for fuel purposes is treated for hydrogen sulfide removal.

As far as management is concerned, all of the information with respect to reserves and a production schedule, field operating characteristics and peculiarities, and plant design is collected and assimilated for but one purpose—to judge and weigh the effects on the amount and time of investment and income. The ultimate province of management in the industry is to combine this information into schedules covering the life of the project and to add thereto a judgment of future product saleability and value, operating costs, and taxes to arrive at a net income, and a probable economic life. The susceptibility of such information to various interpretations by different individuals, motivated by optimistic or pessimistic instincts, gives rise to the lively competition of the business.

Now that the situation appears a desirable one to control, that ghost of the industry—competition for gas contracts—appears. It is almost too much to even hope that one plant would serve such a field, but instead the contracts would end up in the hands of two or three concerns whose duplication of both investments and operating expenses further hazard the profits therefrom. However, once this feature of the enterprise is settled, the data are again reviewed, adjusting the design to the new conditions and adding many refinements such as:

1. A thorough analysis of field line sizes to determine whether the last increments in pipe diameter are justified for the proportionate part of the

*(Continued on page 163)*

PHILLIPS PETROLEUM COMPANY'S

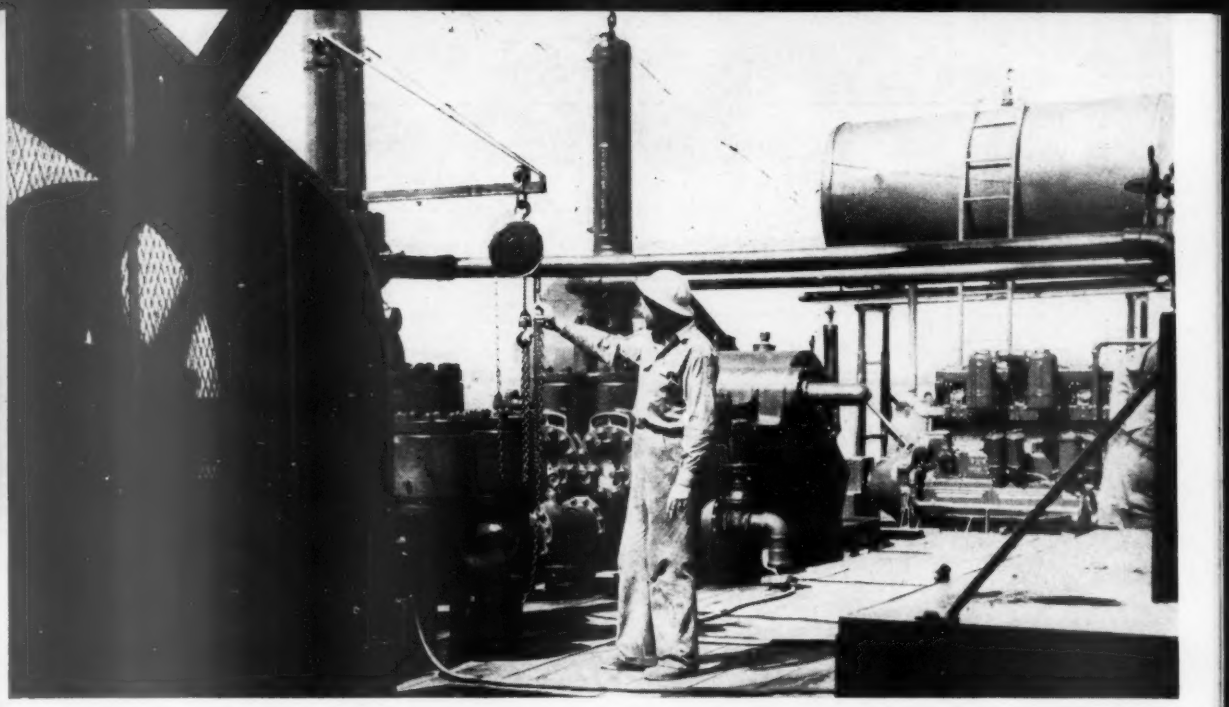
A New World

ACCOMPLISHED WITH
THE AID OF HUGHES
ROCK BITS & TOOL JOINTS

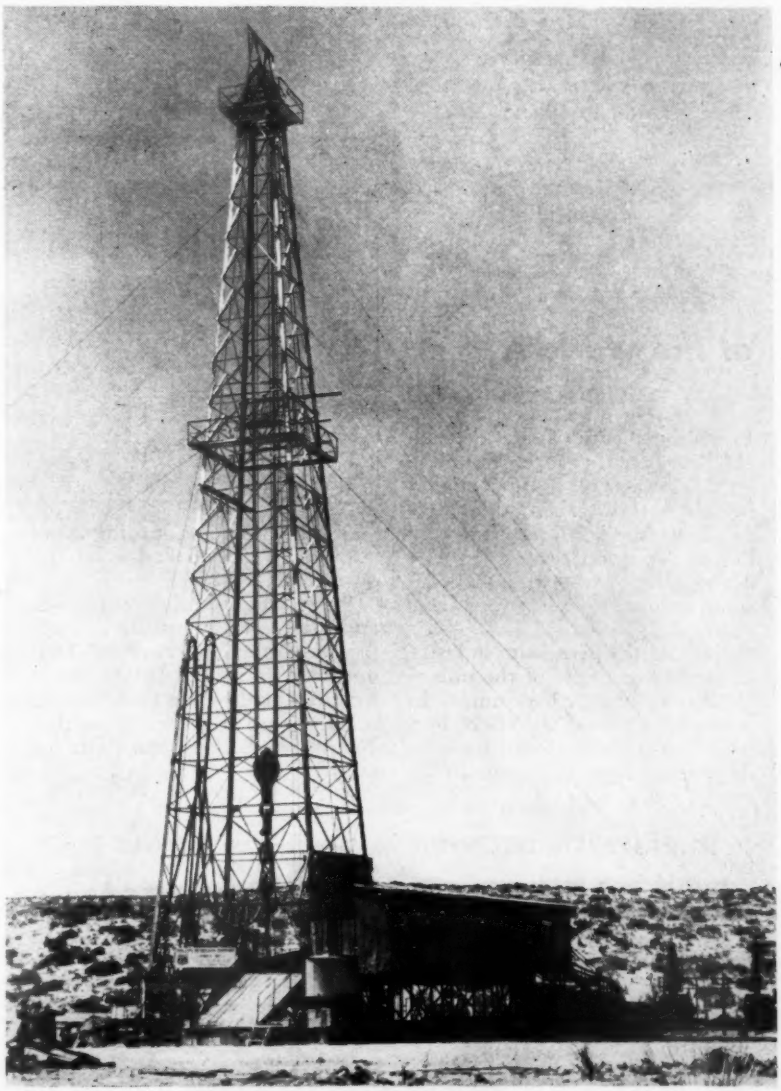
Glen N. Whitman, rig superintendent, and R. E. Aldridge, driller, with Hughes 7¾" Tricone Rock Bit that was "on bottom" when the world depth record was broken.

PHILLIPS PETROLEUM COMPANY
PRICE NO. 1

A Tribute to Management
Manpower and Materials



*Above: Mud pump floor showing mud end of one of the pumps with portion of power end and V-belt drive from engines. At rear is standby pump and engine. In the picture is Z. E. Aldridge, day driller. Right: General view of depth-record-breaking well, with 136-ft. steel derrick set on 7-ft. substructure mounted on 14-in. by 14-in. timbers for a foundation*

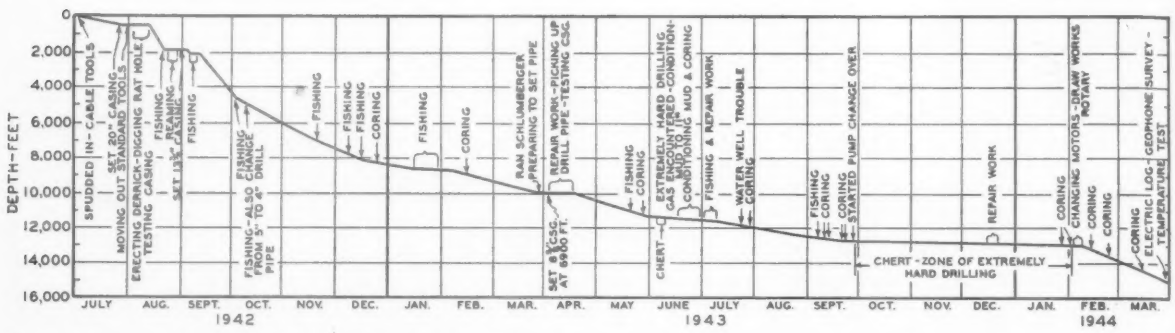


ft. which had stood for approximately 5 years.

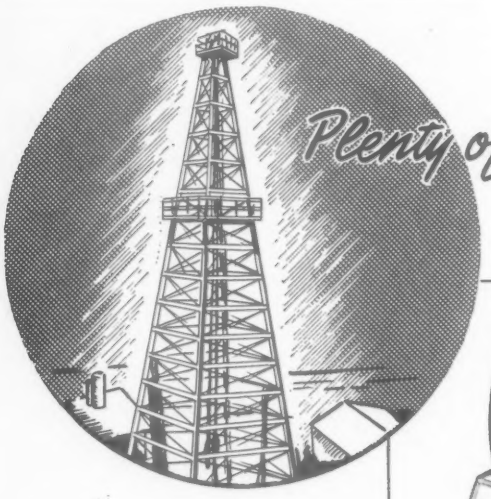
As of April 20 the Phillips well was drilling ahead at 15,255 ft., and no estimate was available as to the depth to which it might be eventually carried. However, regardless of the number of feet by which well might ultimately exceed the previous world's record, the unusual drilling conditions and the length of time required to penetrate some of the sections make it an outstanding drilling accomplishment which many believe will stand for some time.

Setting 13⅜-in. casing at 1,940 ft., the well was drilled with an open hole to 10,008 ft. At this depth 8⅝-in. casing was set at 6,901 ft. so that the well is now drilling with over 8,354 ft. of open hole. The pressure of the heavy mud now being used in drilling amounts to 10,000 lb. per sq. in. at the bottom of the hole, which is approximately 55 per cent of the estimated overburden.

Another fact that makes the drilling of the well outstanding is the hardness of a 125-ft. section encountered below 12,000 ft. During the drilling of this interval the average depth made by 148 bits amounted to only a little over 10 in. The hardness of this formation, which is chert, is approximately the same as the steel in a file. At times this formation presented a serious threat to the further progress of the bit.

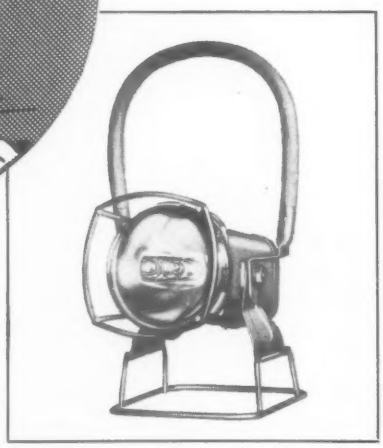



*Drilling time curve for Phillips Petroleum Co. 1 Price. The well was spudded with cable tools June 30, 1942. The previous drilling depth record of 15,004 ft. was passed on March 28, 1944*

Plenty of SAFE light

at the world's deepest well



Providing plenty of safe, dependable light for the workmen on the world's deepest oil well is a mighty big responsibility. Yet, night after night, as the Phillips crews dig deeper . . . and deeper, Justrite Twin-Bulb Safety Lanterns continue to supply instantaneous, *safe* light.

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JUSTRITE *Safety Products*

SAFETY CANS · FILLING CANS · OILY WASTE CANS
APPROVED SAFETY ELECTRIC LANTERNS


Down to a depth of 14,708 ft. a total of 460 rock bits were used. In speculating upon the work involved in running so many bits, many of which were to great depths, a rough calculation shows that the work performed in making up the stands was equivalent to the running of about 900 miles of drill pipe. Including the trips made to change bits, core and fish, approximately 568 trips were made down to a depth of 15,040 ft.

When the well passed the 15,004-ft. mark established by the Continental Oil Co. 2-A K.C.L. well drilled in California during the middle of 1938, the deep-well title was regained by Texas. Prior to the California record, the record for deep drilling was held by the Gulf Oil Co. 103 McElroy well located in Upton County, Texas. This well was drilled to a total depth of 12,786 ft. during the middle of 1935. An interesting comparison of a few pertinent facts relating to the three wells is shown below:

**PHILLIPS 1 PRICE**

| | |
|---|---|
| Total depth, ft. | *15,255 |
| Approximate months to reach total depth | 21 |
| Number bits used | †460 |
| Casing settings: | |
| 20 in. (ft.) | 507 |
| 13⅜-in. (ft.) | 1,940 |
| 8⅝-in. (ft.) | 6,901 |
| Open hole, ft. | 8,354 |
| Bottom-hole temperature, °F. | 248 |
| Maximum mud weight used, lb. | 12.6 |
| Type of rig | Diesel-Mech. |

*As of April 20. †Down to 14,708 ft.

**CONTINENTAL 2-A**

| | |
|---|---|
| Total depth, ft. | 15,004 |
| Approximate months to reach total depth | 11 |
| Number bits used | 191 |
| Casing settings: | |
| 16-in. (ft.) | 497 |
| 10¾-in. (ft.) | 5,512 |
| 7-in. (ft.) | 11,573 |
| Open hole, ft. | 3,488 |
| Bottom-hole temperature, °F. | 268 |
| Maximum mud weight used, lb. | 13.4 |
| Type of rig | Steam |

**GULF 103 McELROY**

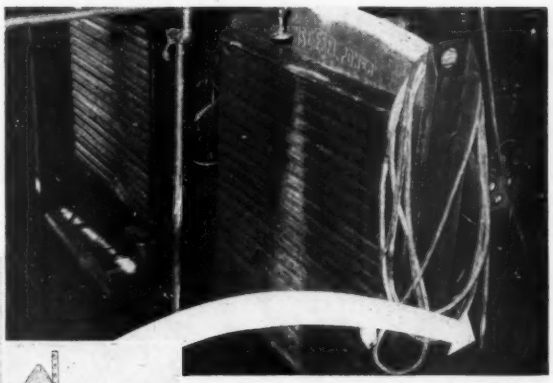
| | |
|---|---|
| Total depth, ft. | 12,786 |
| Approximate months to reach total depth | 27 |
| Number of bits | 697 |

# NUGENT FILTERS *on the job!*

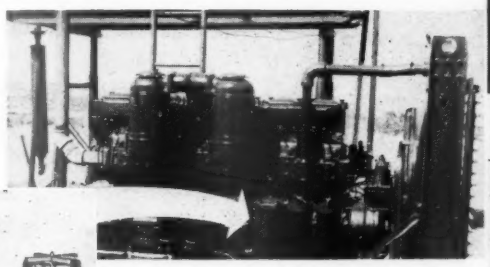
## *at world's record deep well drilling . . .*

When drilling at the Phillips Petroleum Company's Ada M. Price No. 1 reached a depth of more than 15,255 feet, a world's record for deep well drilling was set. The rig used is a Wilson Titan powered by three 225 hp. Cummins Diesels. A fourth Cummins Diesel of the same hp. capacity is used as an auxiliary on the mud pump. For the important job of protecting the lubricating oil and fuel oil used in these Diesel engines—*Nugent Filters were chosen!* . . . another example of how good equipment can help set records in wartime America.

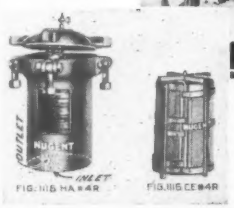
Nugent Filters have 20 times more filtering area than most filters of comparable size—that means 20 times greater interval between cleaning, a reduction in maintenance costs and an increase in engine efficiency. Write for bulletins.



*Above: The three Cummins Diesel engines which are compounded on the drilling rig itself. The Nugent Filter shown is the type used to protect the fuel oil on these engines.*



*The photo above shows the Cummins Diesel engine used to drive the mud pump. Nugent Lubricating Oil Filters help to keep this engine operating with maximum dependability.*



•

Industrial Equipment Co., 6435 Hamilton Ave., Detroit, Michigan • H. J. Kelly, 816 Howard Ave., New Orleans, La. • Thos. A. Short Co., 245 Fremont St., San Francisco, Calif. • Dallas S. Deem, 1215 So. St. Louis Ave., Tulsa, Oklahoma • Harlan G. Bosler, 4452 W. 59th Pl., Los Angeles, Calif. • Darling Bros., Ltd., in all Canada.

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**408 N. Hermitage Ave., Chicago 22, Ill.**

# Moore KAY Type DERRICK

## is being used to drill the world's deepest oil well!

**Phillips Petroleum Company Price No. 1**
**Pecos County, Texas**

| Casing settings: | |
|---|---|
| Surface pipe | |
| 10¾-in. (ft.) | 4,015 |
| 7⅝-in. (ft.) | 10,301 |
| Open hole, ft. | 2,485 |
| Bottom-hole temperature, °F. | 182 |
| Maximum mud weight used, lb. | |
| Type of rig | |

Phillips 1 Price is located 1,980 ft. from NW Section 11, Block 101, Torro Co. Survey, Pecos County, which is approximately 25 miles southeast of Fort Stockton. The block upon which the well was drilled was acquired on the strength of information supplied by an intensive geophysical study of the area. A gravity survey was first made and then a number of core-drill tests were made. Following this type of work, the area was shot by seismograph.

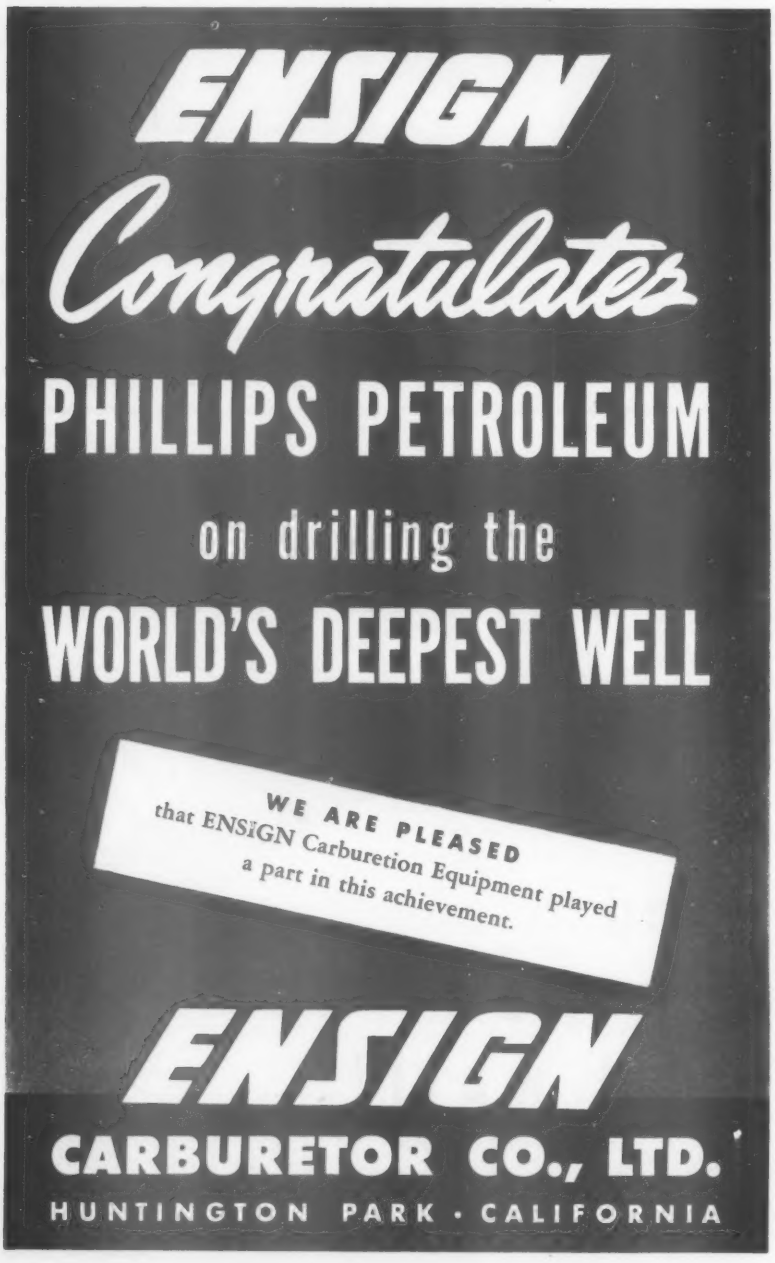
Deep testing of this area has been in the back of many oil men's minds for a number of years. During 1935 there was considerable activity among the major oil companies in blocking acreage in this general area on Permian highs, with the idea of some day drilling Ordovician tests. At that particular time the activity was centered along and on the well-known Fort Stockton high, which is north and east of the town of Fort Stockton. The first Ordovician production in West Texas was found in the Texas Oil & Land Co. Group 1 Oil Corp. 1-B University, Section 39, which was completed in 1929 for a production of 2,590 bbl. per day of 55-gravity oil. This well is located in the Big Lake field which is approximately 60 miles northeast of the Phillips 1 Price. Following the discovery well in the Big Lake field, a number of wells were successfully completed in the Ordovician by Big Lake Oil Co. The occurrence of the geological periods in the Big Lake area is approximately as shown below:

| | |
|---|---|
| Cretaceous | 0- 510 ft. |
| Triassic | 510- 840 ft. |
| Permian | 840-8,250 ft. |
| Pennsylvanian | 8,250-8,306 ft. |
| Ordovician: | |
| Simpson | 8,306-8,512 ft. |
| Ellenburger | 8,512 |

After the Big Lake field was discovered, a number of other Ordovician pools were opened in various West Texas areas. The depths of the Ordovician wells vary from approximately 4,000 ft. in the northern part of Pecos County to 10,000 ft. in the Kermit field in Winkler County.

The rotary tools scheduled for the drilling of Phillips 1 Price were tied up on another location and the well was spudded in with cable tools on June 30, 1942. A 24-in. hole was drilled to a depth of 520 ft. and 507 ft. of 20-in. casing was set. Approximately 1,000 sacks of cement were used in an attempt to cement space behind the pipe to the surface; however, no returns were obtained. It was then necessary to place cement between the pipe and the formation by dumping cement from the surface in batches. In this manner an additional 300 sacks of cement were successfully

*L. H. Long (left), lead tong, and J. W. Morgan, motor man, of day-tour crew with the bit which was being used when breaking the world's drilling depth record. Both men have worked on the Price well since it was spudded*

# WORLD'S DEEPEST HOLE

*uses the*

**Industry's Most Dependable**

# MUD SCREEN

Phillips' Ada Price No. 1 wildcat using a Link-Belt Type NRM-124 Dual Mud Screen.

Phillips Petroleum Company's Ada Price No. 1 wildcat, near Ft. Stockton, Texas, has broken all previous depth records, drilling ahead April 7th at 15,195 feet.

It takes capable men and dependable equipment to accomplish such a record, and Link-Belt is justifiably proud of the fact that a Link-Belt NRM-124 Dual Mud Screen was used to recondition the drilling mud for this valuable operation.

It is not unusual that a Link-Belt Mud Screen had a part in helping to drill this new record depth. A Link-Belt Screen was used on the previous world's record depth hole, 15,004 feet in California . . . on the world's deepest producing well, 13,266 feet in DeLarge Field, Louisiana . . . on Texas' deepest hole, 14,378 feet in Old Ocean Field . . . as well as on most other record depth holes.

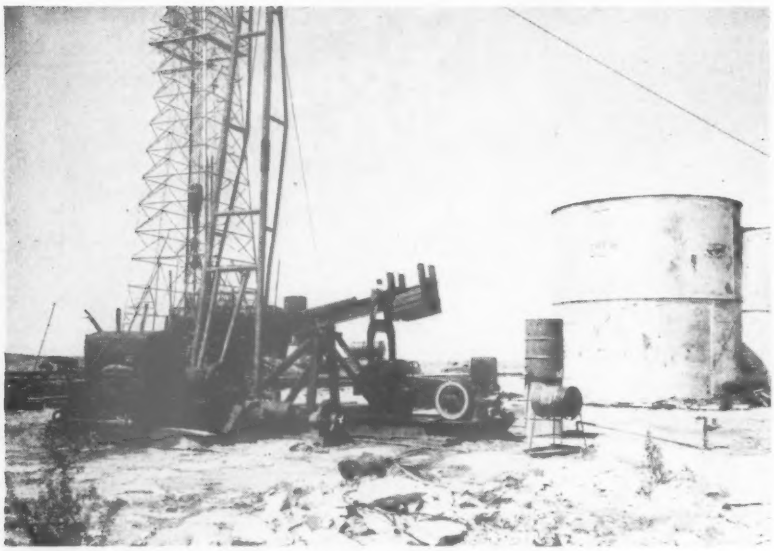
Send for Folder 1872-A for full details of this Mud Screen.

## LINK-BELT COMPANY

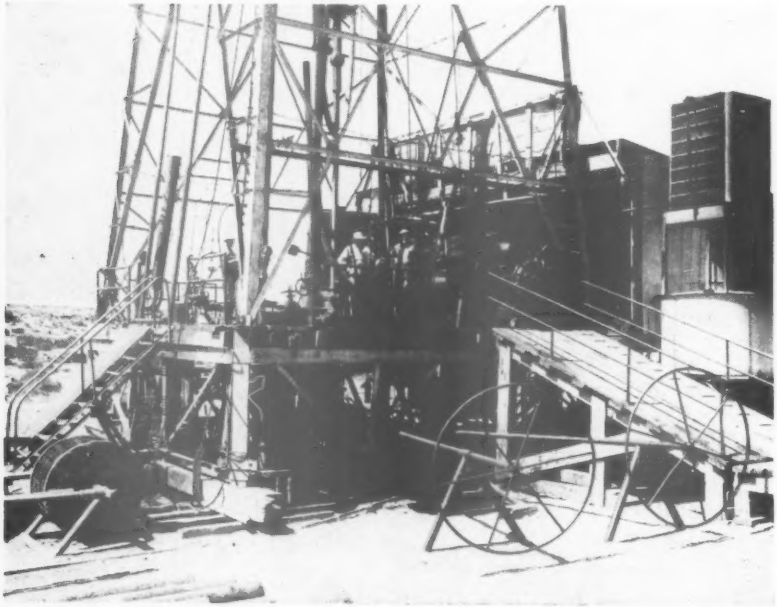
Philadelphia 40, Houston 2, Dallas 1, Los Angeles 33, New York 7, Toronto 8.

*Sold by most supply houses* 9541

# LINK-BELT MUD SCREEN



*Water for drilling operations is supplied from a 662-ft. well pumped with a jack powered by a 6-hp. engine*



*Manual controls for blowout preventer assembly*

placed behind the pipe.

On July 28, 1942, standard tools were torn down and preparations were made for setting up rotary rig. A Lee C. Moore 136-ft. drilling derrick with a 26-ft. base and having a load capacity of 645.000 lb. was erected upon a 7-ft. high substructure, which had been mounted upon 14-in. by 14-in. timbers. On August 5 the rigging up of rotary tools was begun and a Wilson Atlas draw works and two Le Roi V-12 gas engines were moved in. These engines were operated on butane, which, together with the oil and grease used during the drilling, was obtained from the Phillips agent at Fort Stockton, Also included in the initial equipment were a 7¾-in. by 16-in. Gardner Denver pump, five-sheave Emsco crown block, four-sheave Emsco traveling block, Emsco rotary table, National DF swivel, 150-ton BJ hook, and a 7¼-in. by 14-in. Oilwell standby mud pump.

On August 12, rotary drilling was begun at 520 ft. and a 12-in. hole carried to 1,948 ft. The hole was then reamed to 17½ in. to accommodate 13⅜-in. casing which was set and cemented with 1,600 sacks of cement at 1,940 ft. The first 5,000 ft. of drilling, or practically one-third of the hole was drilled rather quickly, requiring approximately only 15½ per cent of the total drilling time of 21 months. Down to a depth of 4,953 ft. 5 $\frac{5}{16}$-in. drill pipe was used and at this depth it was laid down and 4½-in. was pulled in. During the first 5,000 ft. there were four fishing jobs. Approximately 42 bits were used during the drilling of this interval.

A fishing job which occurred at a depth of 2,145 ft. was responsible for a loss of approximately 6 days during this first interval of drilling. The 5 $\frac{5}{16}$-in. drill pipe twisted off at 1,395 ft. while reaming at 2,045 ft. The first run of an overshot successfully caught the fish but in attempting to pull, the hold was broken. Approximately 1,000 gal. of acid were spotted in an unsuccessful attempt to loosen the fish and it was then necessary to cut the drill pipe. Two cuts were made and the pipe was recovered down to 2,011 ft., which left a drill collar single and 28 ft. of a joint in the hole. After washing over the fish, it was caught with an overshot and recovered. This was the only one of the four fishing jobs down to 5,000 ft. which accounted for much loss of time.

During the next 5,000 ft. of hole drilling was extremely hard, requiring a total of 137 bits for the interval. An 8¾-in. hole was carried to 10,008 ft. During this second 5,000 ft. of hole there were four fishing jobs, and these, together with the fact that the digging was tougher, were responsible for this section of the hole taking up approximately 26½ per cent of the total time spent on the well down to approximately 15,000 ft. At a depth of 10,008 ft. the 8¾-in. hole was reamed to 11 in. down to 6,901 ft. to accommodate 8⅝-in. casing, which was set and cemented with 200 sacks of cement at 6,901 ft. on April 1, 1943. Before this pipe was set an electric survey was run.

As the hole progressed, several changes were made in equipment, the first being when the depth reached 8,503 ft. At this point a new double-deck National crown block was installed. At 8,707 ft. a new 200-ton BJ hook was placed into operation. At 10,008 ft. Shaffer control equipment was installed on the well. The 4½-in. drill pipe was replaced with 3½-in.

Control equipment installed at this time consisted of a 9-in. double-cellar control gate and one 9-in. single-cellar control gate, above the double gate, both of which were connected with a Type A connecting spool. The single gate was equipped with 3½-in. drill-pipe rams, and the same sized rams were in the top section of the double gate. The lower compartment of the double gate was equipped with complete shutoff rams for closing in the well when the drill pipe was out of the hole. All of this

equipment is designed and tested for use under high-pressure conditions to be expected in deep drilling projects of this kind.

The third interval of hole, or that from 10,008 ft. down to approximately 15,000 ft., is perhaps the most difficult which has been drilled in the history of the oil industry. One year and 4 days were required during the drilling, and fortunately comparatively little time was lost due to mechanical trouble or fishing jobs. Cores were taken at frequent intervals, which of course slowed the drilling. During the drilling of this third part of the hole 281 bits were used and the average number of feet drilled per bit amounted to only a little over 53. Approximately 58 per cent of the total time on the well was consumed during the third interval.

Several changes in equipment were made during the drilling between 10,008 ft. and a little over 15,000 ft. At 11,600 ft. the third blowout preventer was installed and at 12,084 ft. a new five-sheave Regan traveling block was put into service. Ten lines were strung up at this time. A C-350 National pump was placed in service at 12,725 ft.

### Hard Chert Drilling

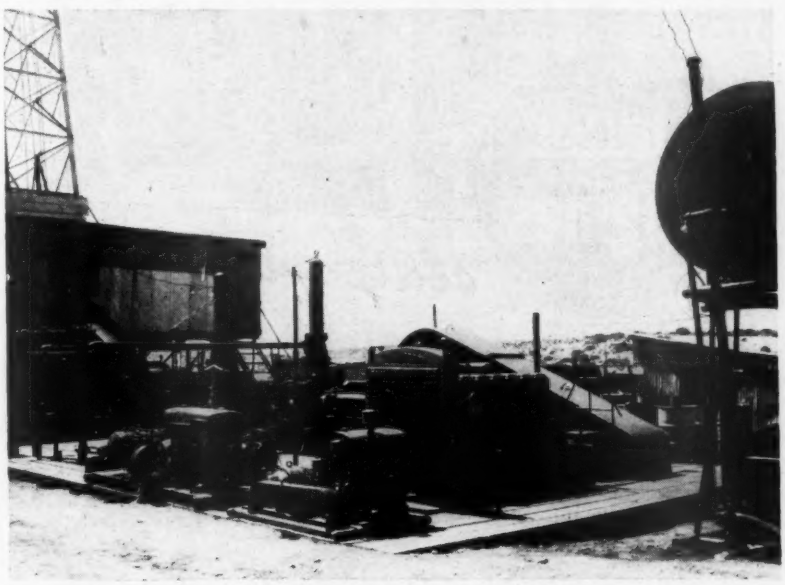
At 11,460 ft. the first taste of really hard digging was experienced. The formation was cored from 11,467 ft. to 11,469 ft. and 4 in. of hard black shale and chert were recovered. Beginning at 11,469 ft. two bits were required to drill the next 2 ft. From 11,471 ft. the first bit run made 9 in. and the second bit only 3 in. At 11,473 ft. the formation softened and 1 ft. was drilled in a period of 15 minutes. In reaming the hole from 11,473 ft. to 11,493 ft. two reamers were worn out. In discussing the hardness of the formation, one of the men responsible for the drilling of the well facetiously remarked that the bit seemed to break through into easy digging at around 11,510 ft. and they bogged it on down 46 ft. during the next 5 days. This "easy" digging amounted to an average of 9.2 ft. per day. The bit used before the hard digging was encountered made 32 ft.

During this third interval, the only fishing jobs which caused appreciable delay occurred at 11,639 ft. At this depth approximately 92 ft. of drill collar was dropped in the hole. This was recovered with an overshot. This work, together with some time spent in repairs covered a period of approximately 10 days.

Changes in two items of equipment were made below 12,900 ft. At 12,914 ft. a 20-in. Gardner Denver pump was installed and at 12,924 ft. a National DF swivel was put into service.

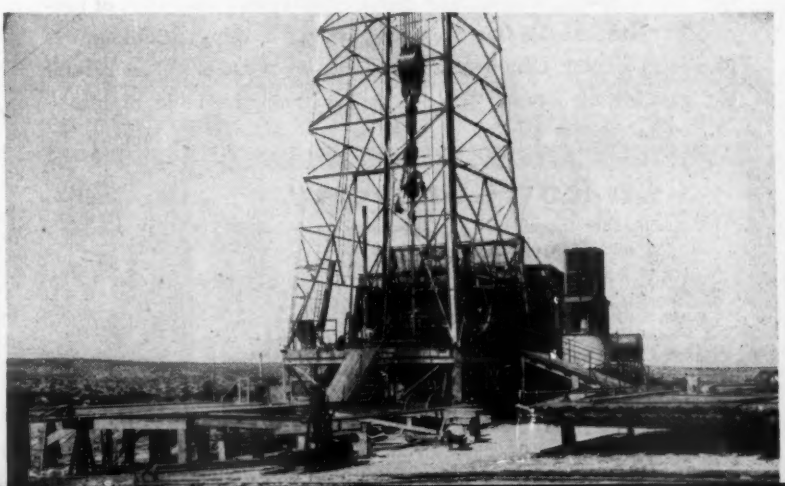
Beginning on September 28, 1943, when the hole had progressed to 12,832 ft., the tough digging which loomed ahead of the drilling crew was

*Day tour drilling crew. Left to right: Z. E. Aldridge, driller; J. W. Morgan, motor man; J. T. Burge, derrick man; L. H. Long, R. L. Tucker, and Charles Powe, roughnecks*



*Back of rig showing mud pump installation with auxiliary equipment, including lighting units and standby pump and engine, in foreground*

*Closeup of rig setup showing foundations. At right is cooling tower for diesel engine hydromatic brake water*



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destined to require a drilling period of approximately 4 months. This is believed to be the most difficult section ever penetrated in drilling history. The formation negotiated during this period is chert, commonly known to the layman as flint. This material is a variety of silica and was deposited by infiltration. It occurs in concretionary masses interbedded with limestone, particularly in formations of the Paleozoic era. As an example of the hardness of chert, its Moh hardness number is 7, whereas, that of the diamond is 10. The Moh hardness of steel varies from 4 to 9. Chert will cut glass, and also indent some types of steel.

### Drilling Bit Record

With some idea of the hardness of this formation it is not surprising that 155 bits were required in the drilling from 12,829 ft. to 12,954 ft.—a distance of only 125 ft. During the drilling of this section, the penetration averaged by the total number of bits used amounted to only 0.85 ft. A table showing the average number of feet drilled per bit at various intervals is shown below.

**BIT DATA**

| Footage interval | No. of bits | Average No. feet per bit |
|---|---|---|
| 520- 1,948 | 9 | 159.0 |
| 1,948- 6,901 | 54 | 91.8 |
| 6,901-10,008 | 116 | 26.9 |
| 10,008-12,829 | 106 | 26.6 |
| 12,829-12,954 | 148 | .85 |
| 12,954-13,029 | 7 | 10.7 |
| 13,029-14,708 | 20 | 84.0 |

At intervals during the drilling of the 12,829-12,954-ft. section shown above, the driller's records showed the following points where bits were completely dulled without taking any penetration at all:

12,835 ft. — 1 bit run — no hole
12,840 ft. — 1 bit run — no hole
12,845 ft. — 2 bits run — no hole
12,851 ft. — 4 bits run — no hole
12,853 ft. — 3 bits run — no hole
12,855 ft. — 1 bit run — no hole
12,857 ft. — 3 bits run — no hole
12,878 ft. — 2 bits run — no hole

At 13,005 ft. the well was cored 4 ft. and a 3-ft. recovery of chert and shale was made. This marked the end of the longest, hardest section ever drilled, and on February 2, 1944, the total depth was 13,029 ft. in lime.

At this depth, Wilson Titan draw works and three LI-600 Cummins diesel engines were installed. Also at this depth, a seven-sheave Regan crown block, 16-in. Gardner Denver standby pump, Emsco rotary table, BJ tongs, links and elevators, were in service.

Approximately 8 days were required to change the rig at this depth. The three engines are chain connected and may, of course, be compounded or run separately on either the pump or the draw works. A tachometer from each of the three engines is located conveniently near

# CONGRATULATIONS

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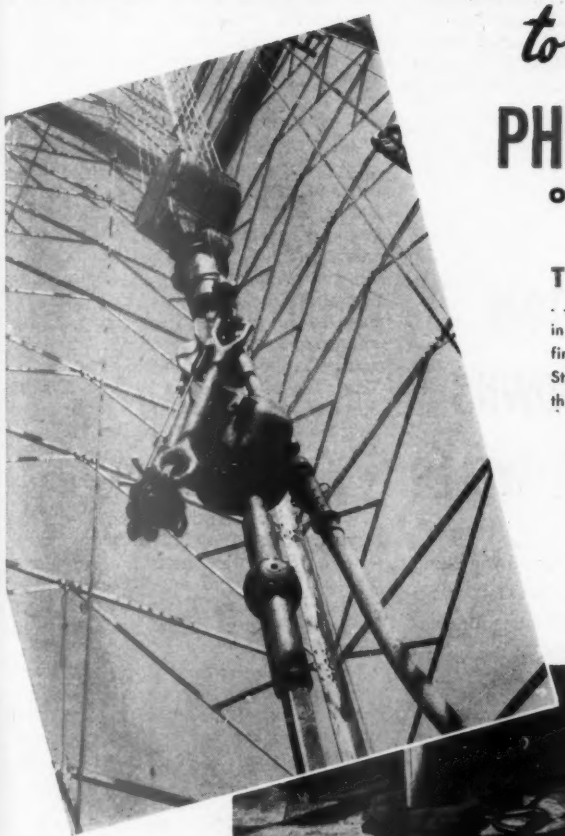
**on drilling the world's record depth**



T.I.W. Lubricated Grief Stem Safety Valve used on this world record well.

### T.I.W. GRIEF STEM SAFETY VALVE

. . . is the only valve on the market having lubrication. Assures positive operation in an emergency. This valve prevents blowouts through the drill stem, prevents fires, and reduces danger to the lives of crew.

Streamlined so that catline will not hang upon valve stem, another safety feature that protects crew and equipment.

### T. I. W. RELINER TYPE SLIPS

**DO NOT CUT PIPE**

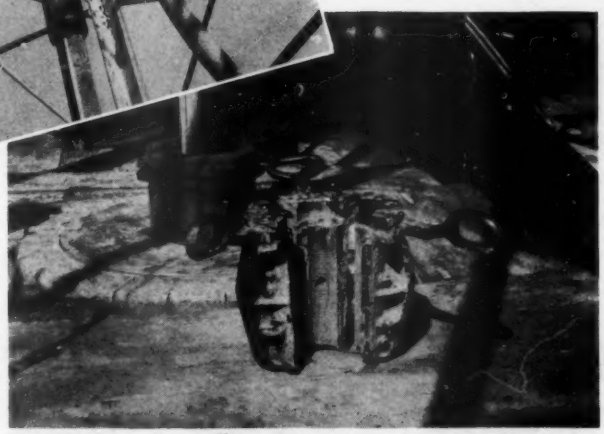
**WILL NOT SLIP THROUGH ROTARY**

THREE PIECES IN ONE UNIT KEEPS SEGMENTS IN PERFECT ALIGNMENT—Positively prevents crushing pipe as one segment cannot get out of alignment with the others. Will not drop through rotary bowl, thus preventing a bad fishing job.

THE THREE SEGMENTS MAKE A THREE-POINT BEARING ON THE CIRCUMFERENCE OF THE ROTARY BOWL and the self-centering segments give a uniform bearing on the pipe.

THE SAFETY HANDLES are convenient to grip, long enough to clear elevators, and curved to clear top of rotary eliminating any danger to operator's hands.

RELINERS CAN BE RESHARPENED NUMEROUS TIMES. Reliners can be furnished for different size pipe thus saving the operator from having to buy a complete set of slips for different sizes of pipe.



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OVER A QUARTER OF A CENTURY EXPERIENCE MANUFACTURING PRACTICAL OIL FIELD PRODUCTS

the controls, and also the usual temperature gages. By watching the temperature gages the driller may check the operation of the engines. When all engines are evenly loaded the temperature of the exhausts runs at around 800° F. Also near the controls is a unitized Martin Decker weight indicator and rotary tachometer. To minimize the possibility of down time, the rig is equipped with the standby units usually carried.

One extremely practical feature of the rig is the engine substructure, designed by A. G. Baker, driller. Constructed from discarded 3-in. and 5-in. drill pipe and 2½-in. tubing, it is built so that it can be easily telescoped to a width of about 7½ ft. to facilitate transportation. When installed it is 12 ft. wide and 24 ft. long. Incorporated into the substructure are a number of built-in features which save considerable time when rigging up or tearing down. These built-in features consist of the standby air compressor and engine, main compressor (driven from rig) fuel manifold, air manifold and air storage tanks. An idler for the belt drive from engines to mud pump, equipped with an adjustable, self-aligning bearing is also built into the base of the substructure. In addition to these features, a leg of the substructure acts as a settling bulb for the fuel oil. When rigging up or tearing down, breaking the unions to lines leading to various parts of the rig is essentially all of the work involved.

One of the accompanying photographs included in this article shows the draw works and controls, and also shows the manner in which the 30-ft. 8-in. length of head beam has been reinforced by means of 4-in. drill pipe and braces. This steadies the tie down and was designed by F. A. Jennings, of Phillips.

### Bottom-Hole Temperature

At 15,036 ft. a two-thermometer temperature survey was made showing the bottom-hole temperature as between 235° and 240° F. If it should become necessary to set a string of casing at this depth, several tons of ice will probably be necessary to keep the temperature down while cementing. At this depth the pump pressure amounts to about 1,400 lb. and the rotary table speed is held at 50 r.p.m. The drill pipe weight is over 200,000 lb., and the drillers attempt to hold approximately 16,000 lb. on the bit. Also at this depth, the time required in making a round trip amounts to approximately 9 hours.

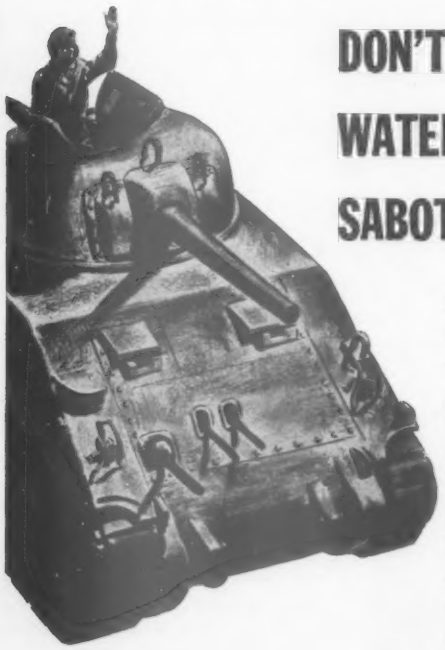
Water for drilling operations is furnished from a 662-ft. water well which was drilled near the rig when the well was started. Water storage capacity consists of two 500-bbl. steel tanks, located a short distance from the well.

During the drilling of the well considerable attention was given to the conditioning of the mud, beginning at 520 ft. when the rotary rig was moved in. Down to a depth of 1,940 ft. mud was held at 9.2 lb. to 9.8 lb. per gal., with A.P.I. Marsh funnel viscosity at 32 seconds (1,500 cc. in, 1 qt. out).

From 1,940 ft. to 5,494 ft. mud weight ran 9.6 lb. per gal., with the viscosity ranging from 32 to 34 seconds. At 5,494 ft. chemical treatment was begun to improve the condition of the mud, and the weight was increased to 10.1 lb. This weight was held down to a depth of 10,008 ft.; however, the viscosity was allowed to increase to 46 seconds by the time the depth of 8,700 ft. was reached.

After the 8⅝-in. casing was set at 6,901 ft. when the total depth of the hole was 10,008 ft. drilling was continued with mud weight at 10.2 lb. per gal, with a viscosity of 40 seconds. The water loss (taken on low-pressure filter press—30 minutes at 100 lb. per sq. in.) was reduced to 18 cc., and filter cake thickness 5/32 in. Drilling was continued with this mud to a depth of 11,556 ft. and at this point gas pressure was encountered. The mud weight was then increased to 11.4 lb. per gal., with the viscosity at 48 seconds. The water loss was reduced to 12 cc. and at 11,653 ft. it was further reduced to 9 cc.


Oil wins wars!



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Every barrel of precious oil you pump is a blow at the Axis! Don't let bottom water seepage stop it flowing for a single day. Be prepared with Eagle Lead Wool in your store room. It tamps easily into cracks and crevices around the bottom of the hole to make a solid, lasting, water-tight seal! Economical Eagle Lead Wool is rapidly installed in cartridge-shaped Eagle Wire Containers, sized to fit all casings. Safeguard against bottom water sabotage—order through your jobber today!

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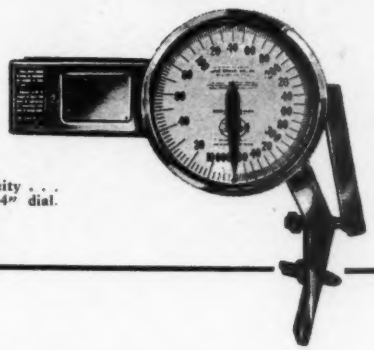
## on the WORLD'S DEEPEST WELL

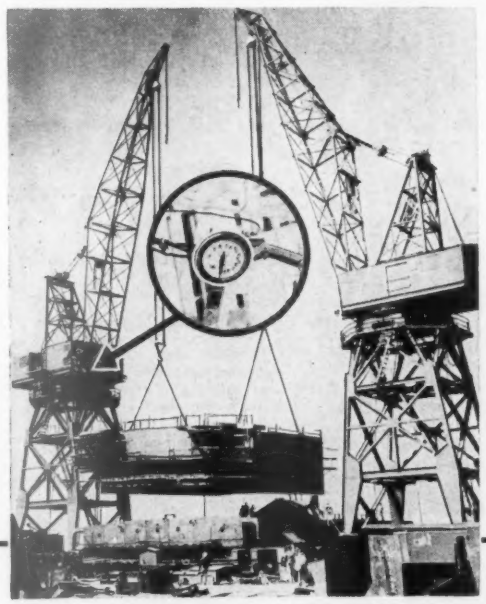
Our "Regular Driller" Model Line Scale weight indicator (shown on the right) was used, for a time, on the Phillips Petroleum Company's No. 1 Price. We are proud that our Line Scale was worthy to have had a part in the drilling of the world's deepest well.



"Regular Driller" has a 360,000 pound capacity . . . with or without alarm light. Has 12" or 14" dial. Weight 91 pounds. Boxed, 130 pounds.

## *Doing its Part . . . .*

## for an EARLY VICTORY



Line Scales are doing their part for Victory, too. Many are now in operation on ship yard cranes, guarding them against over-load. The photograph at the left (used by permission of the Maritime Commission in New Orleans) shows a Gulf Coast ship yard where Electric Line Scales are standard equipment on all gantry type cranes. Our audible alarm signal instruments meet all Maritime requirements.

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LINE SCALES are still available for important jobs on the home front. Because of their accuracy and foolproof operation, our LINE SCALES are standard equipment in practically every oil field today. Standard sizes range from forty thousand pounds to five hundred thousand pounds capacity. Write for folder and prices.

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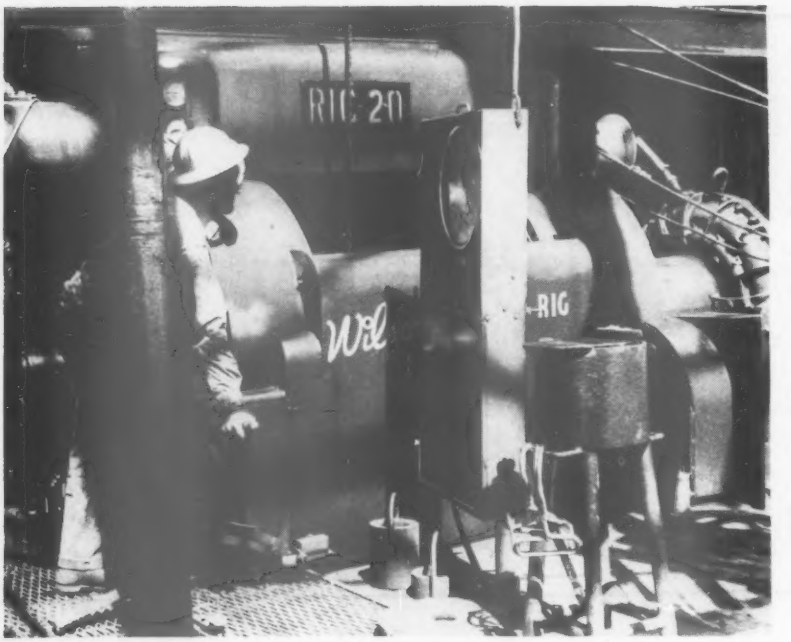
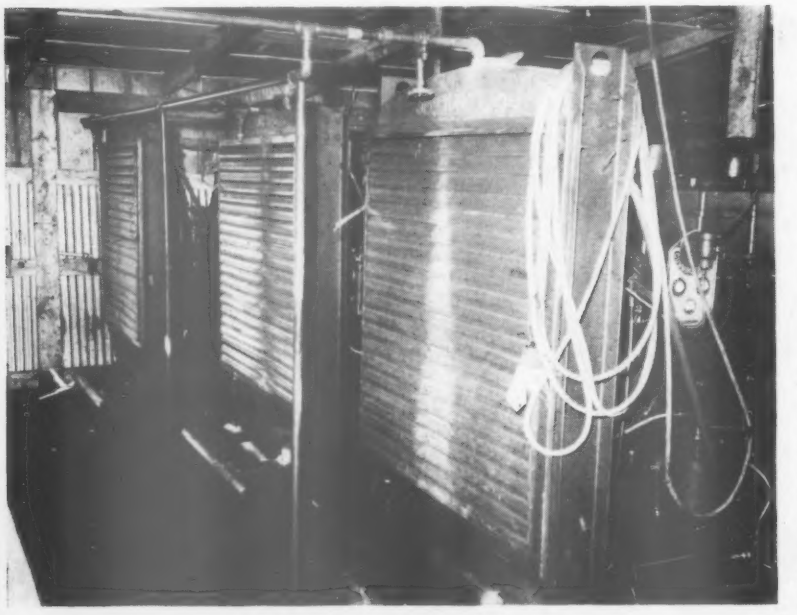



*Draw works showing the controls and the unitized instruments, including the weight indicator and the rotary tachometer. Z. E. Aldridge, day driller, is at the brake handle*



*Three 350-hp. diesel engines furnishing power for draw works, rotary and regular mud pumps*

At 11,731 ft. the mud weight was increased to 12.2 lb. per gal. to eliminate gas cutting. The viscosity was raised to 60 seconds and the water loss was reduced to 8 cc. with filter cake thickness of 2/32 in. This mud condition was maintained to 13,495 ft. and at this depth it was raised to 12.5 lb. with a 60-second viscosity, and a water loss from 8 cc. to 9 cc. This mud condition prevailed to the present depth of 15,255 ft.

After raising the mud weight at 11,556 ft. to hold gas pressure, control of all mud characteristics was begun to provide for safety and obtain the highest drilling rate possible. Aside from the weight of the mud, particular attention was paid to water loss of the mud, viscosity, as determined by the Stormer viscosimeter, initial and 10-minute gel strengths, as determined by the Stormer, and the pH value.

The importance of control of water loss is emphasized by the fact that the open shale section from 6,901 ft. to the top of the chert at 12,829 ft. was open from September 2, 1942, to the present date. This open shale section has given no trouble while water loss was 9 cc. or less; however, on several occasions, the water loss increased for short periods of time to about 16 cc. and considerable sloughing of the shale was observed.

Viscosity, as determined by the Stormer viscosimeter, was held between 42 and 53 centipoises by chemical treatment of the mud. Lime streaks and other similar types of formation increased the Stormer viscosity occasionally, but this was controlled by chemical treatment.

The initial gel strength, as determined by the Stormer viscosimeter, was held to a value as near 1 g. as possible. Due to several conditions prevailing on the 1 Price, an extremely low initial gel strength was indicated.

### Types of Mud Materials

The 10-minute gel strength, as determined by the Stormer viscosimeter, was maintained at a value of 40 to 50 g. This control not only furnished a satisfactory safety factor in preventing "settling out" of mud solids and weighting materials, but also contributed materially to saving weighting material as reflected by the small amount of weighting material used on a well of this depth and the number of drilling days.

The pH value of the drilling mud was maintained at approximately 8.3, and very few adjustments were necessary as it generally remained at the desired value over long periods of drilling.

The types of mud materials, amounts used, and total cost are shown in the following table:

| | |
|---|---|
| Bentonite | 250,400 lb. |
| Native clays | 54,600 lb. |
| High-yield clays | 213,000 lb. |
| Weighting material | 1,038,300 lb. |
| Mud-treating chemicals | 15,431 lb. |
| Fibrous materials | 2,050 lb. |
| Total mud cost not including drayage | $25,302.15 |
| Total mud cost including drayage | 31,492.15 |
| Mud cost per foot of hole drilled (less drayage) | 1.71 |

When the many difficult problems encountered in the drilling of the well are considered, the operation itself becomes a tribute to the careful judgment and expert technique exercised by those in charge, and those doing the actual drilling. At no time has the deviation of the hole from the vertical exceeded one-half of 1°. During the drilling of the well the calling of crew members for military service at times added to the difficulties of the drilling operations.

Field executives connected with the

drilling of the well are: Charles Daniels, division superintendent, with offices in Amarillo; M. L. Atkinson, assistant division superintendent, located at Odessa; Walter Russel, district superintendent with headquarters at Big Spring; and Glenn Whitman, tool pusher, located at Fort Stockton.

Making up the current crew of 1 Price are Drillers Z. E. Aldridge, A. G. Baker, J. A. Leatherwood, and Roughnecks R. L. Aldridge, J. T. Burge, R. A. Davenport, C. S. Geer, J. W. Hart, Delbert Herring, R. W. Holder, V. L. Jeffreys, C. E. LeMaster, Charles Powe, E. L. Powell, G. E. Robbins, R. L. Tucker, L. H. Long and J. W. Morgan.

During its 22 months of turbulent life, 1 Price has been a "tight" well as far as drilling and geological data were concerned. However, when the depth record was shattered, the new champ practically became public property.

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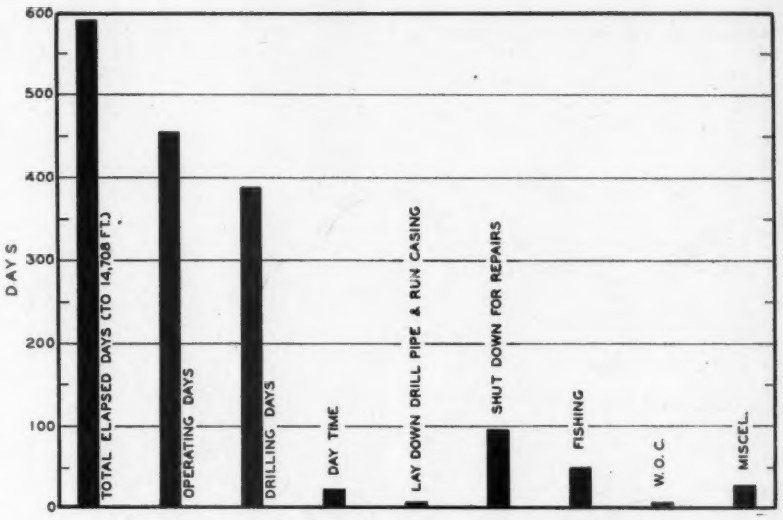
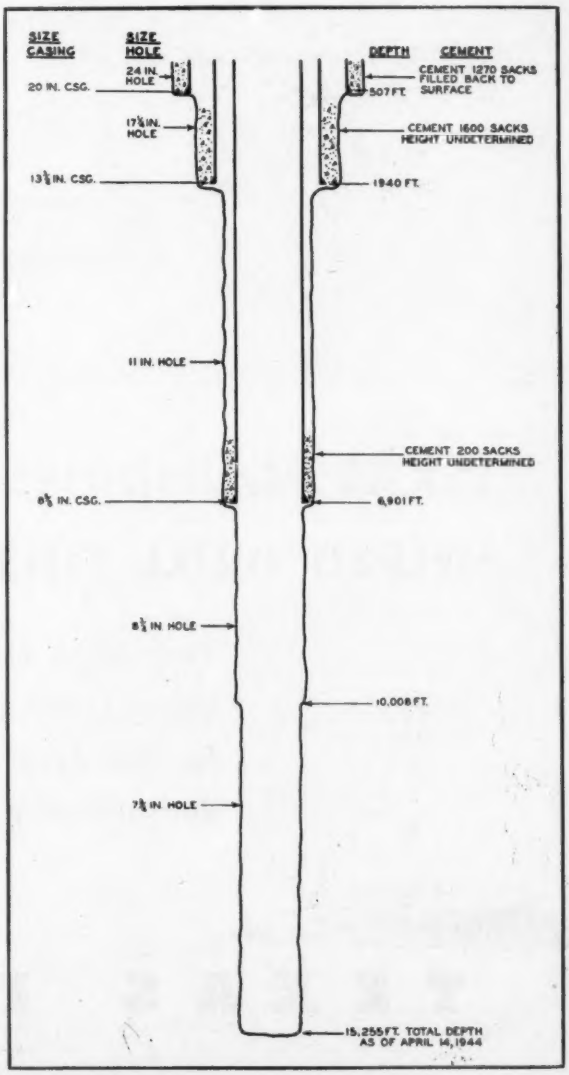



*Comparison and analysis of time records of various phases of operations during drilling of deep well*

*Right: Hole diagram showing hole sizes and casing program. Open hole has been drilled below 8⅝-in. protection casing, set at 6,901 ft., to bottom*



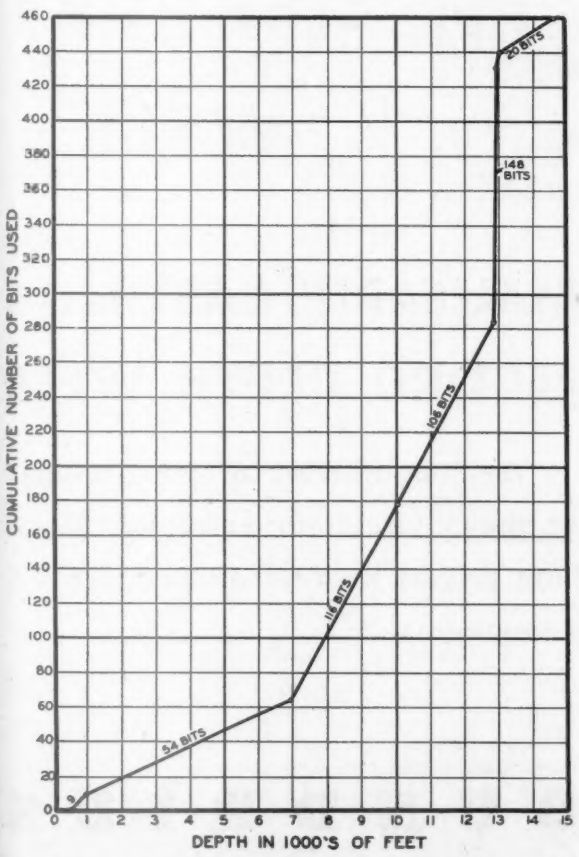
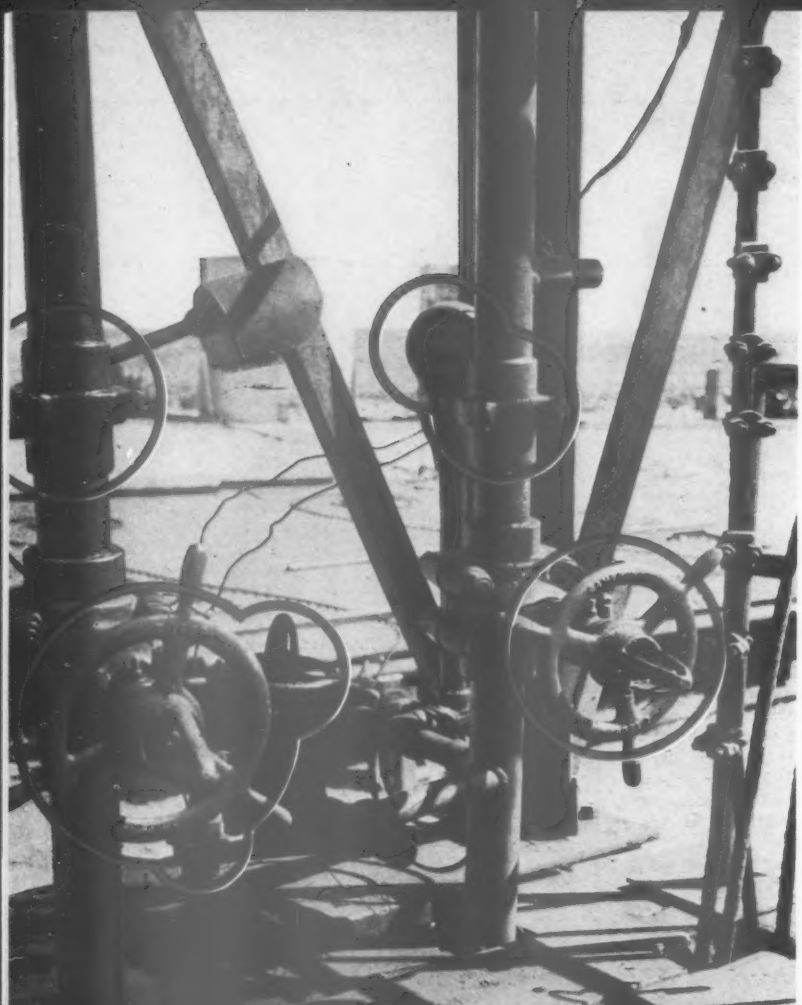




*Chart showing number of bits used versus hole drilled*



*Congratulating*

PHILLIPS PETROLEUM CO.

**on drilling**

# WORLD'S DEEPEST WELL

## TEXAS FOUNDRIES' *MALLEABLE* CASTINGS HELPED DRILL THIS RECORD DEPTH WELL

**They were used in the manufacture of the products shown in the circles above, vital items carefully chosen for this deep drilling project because of their proved dependability and toughness.**

# TEXAS FOUNDRIES

*Organized for Service*

LUFKIN TEXAS

# Perseverance Displayed in Drilling Phillips Well to New Depth Record

IN a statement appearing in the current issue of Philnews, monthly magazine published by Phillips Petroleum Co., Bartlesville, Okla., officials of the company pay tribute to the perseverance and patience of the personnel responsible for drilling the company's 1 Price, depth-record-breaking well in Pecos County, Texas. Following is a portion of the statement:

Gusher or duster, our 1 Price well down in Pecos County, Texas, will still be the world's champion on several counts when it bottoms. To begin with, it is the world's deepest well. March 28 it ground past the former world's record of 15,004 ft. held by a Continental Oil Co. well in the Wasco pool of California, and it is fast approaching the 3-mile mark with no known contenders for its title. As a consumer of drilling bits, 1 Ada Price undoubtedly tops all records. As this story goes to press it was drilling at 15,255 ft. and had used more than 475. No other well ever encountered so many of the flint-like, almost impervious "chert" or "driller's hell." Thinking logically, this leads to the conclusion that another world record has been established by 1 Price—a record in perseverance, patience, and, no doubt, profanity.

When Rig 20 was moved into the 1 Ada Price location about 35 miles southeast of Fort Stockton, no world records were intended. We were on another of our many oil hunts. We had done subsurface, gravity and seismic testing, and we were spotting a wildcat in the midst of a solid 25,000-acre block of leases.

### Ordovician Test

Our object was to test thoroughly the Ordovician formation from which much of the production in the southwest is obtained. In the Apco field, 30 miles to the north, the pay horizon appears at about 4,500 ft. In the sand hills of Crane County, it is reached at about 6,000 ft., and it drops to 7,500 and 8,000 ft. under the Embar in Andrews County. That it would be encountered at almost twice this depth in southeastern Pecos was a matter that only several hundred drill bits could determine.

The well was spudded June 30, 1942, 1,980 ft. from the north and west line of Section 11, T.C.R.R. Co. Survey. At 520 ft., standard tools were moved out, the rotary rigged up, and everything started off in routine fashion. Glen Whitman, an old hand at rotary operations, was in charge as rig superintendent. The manpower situation didn't look too promising, but three normal 8-hour crews were maintained, all experienced men.

The men lived in Fort Stockton and drove back and forth to the well. Its 136 ft. of steel derrick stuck up out of the sage brush and yucca-covered hills like an island lighthouse. Men on the midnight tour, easing along the hastily graded road leading across the Price ranch, avoiding livestock, welcomed the tall string of lights as far as they could see them during those first few months. Later, when the going got so rough that the job meant nothing but running drill pipe in and out of the hole for new bits, they got so they cussed the lights and the well itself but they hung on. The 1 Ada Price became her own worst enemy. She set another record in labor turnover. With military losses to augment the high score, 115 men have been employed on the well at one time or another. Only three men — Whitman and Roughnecks J. W. Morgan and L. H. Long—have stayed it out since the beginning.

Luckily for the morale of everyone concerned, most of the fishing jobs occurred between 2,000 and 9,000 ft. If fishing, mechanical troubles and chert had befallen the crews all at once, the jig would have been up. One of the toughest fishing jobs occurred at 8,007 ft. and lasted 2 weeks.

At around 10,000 ft. the footage made by each bit began to drop off somewhat. From 62 ft. made in 31 hours at 9,085 ft., bits were making only 39 ft. and 27 ft. in 18½ hours 250 ft. later. The drilling log read "sand and shale". By the end of March 1942, the well was down 10,000 ft. and mechanical difficulties set in. Rotary repairs caused a 2-week shutdown. Mud conditioning required close attention and additional control equipment was installed. Between 10,008 ft. and 12,829 ft., where chert was encountered, 127 trips were made in and out of the hole—reaming, coring, fishing and changing bits.

But the payoff occurred between 12,829 ft., reached on September 24, 1943, and 12,954 ft. drilled on January 25, 1944—a depth of 125 ft. made in 4 months. Motor trouble developed, mud pumps had to be changed, rotary repaired, but now it was the

### Daily Drilling Report of 1 Price for 30 days during which time world's depth record was passed

| | |
|---|---|
| **March** | |
| 15 | D 14,527, lime and shale. |
| 16 | TD 14,550. Cored 14,536-50, coming out of hole with core. |
| 17 | D 14,553, lime and shale. Cored 14,536-50, recovered 2 ft. shale in small fragments. |
| 18-20 | D 14,611, lime and shale. Changed bit. Last bit made 80 ft. |
| 21 | D 14,750, lime and shale. |
| 22 | D 14,773, lime. |
| 23 | D 14,837, lime and shale. Last bit made 75 ft. |
| 24 | D 14,860, lime and shale. |
| 25-27 | TD 14,995, shale and lime. Last bit made 33 ft. |
| 28 | TD 15,017. Running Schlumberger survey at 15,007. |
| 29 | TD 15,020. Now running Geophone survey. |
| 30 | D 15,036. Ran temperature survey. Two thermometers, 235° and 240°. |
| 31 | D 15,040, lime. |
| **April** | |
| 1-3 | TD 15,119. Making trip to change bits. Last bit made 16 ft. |
| 4 | TD 15,142, lime. Coming out of hole to core. |
| 5 | TD 15,156, coring. Started coring at 15,150, making 1 ft. every 45 or 50 minutes. |
| 6 | D 15,171. Cored 15,150-60. Recovered 2½ ft. Dolomite. |
| 7 | TD 15,195. Going in hole with new bit. Top Ellenburger, 15,075. |
| 8-10 | TD 15,250. Cored 15,240-50, recovered 1 ft. Coming out to repair pump. |
| 11 | TD 15,250. Reamed core hole 15,240-50. Circulating. Down 12 hours repairing pump. |
| 12 | TD 15,250. Going in hole to take 5-ft. core. |
| 13 | TD 15,255. Cored 15,250-55, recovered 1 ft. lime. Repairing clutches and motors. |
| 14 | TD 15,255. Down 24 hours repairing clutches. |

heartbreaking business of running one bit after another. In all, 148 bits were used during this period, and 157 round trips were made with the drill pipe, each trip requiring a little under 7 hours. Each day's drilling report was as discouraging as the one before:

"Pulling dull bit. Two bits made 1 ft."

"Ran four bits with no hole made. Down 12 hours conditioning mud. weight dropped to 11.6 lb."

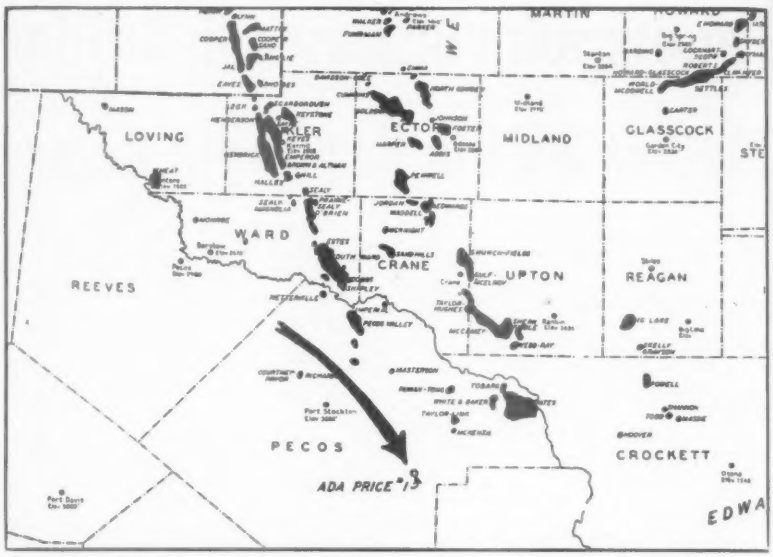
"No hole with two bits. Drilling ahead."

"Two bits made 2 ft. On bottom with new bit."

"Ran one bit, made no hole. Down 16 hours repairing crown. Now going in hole."

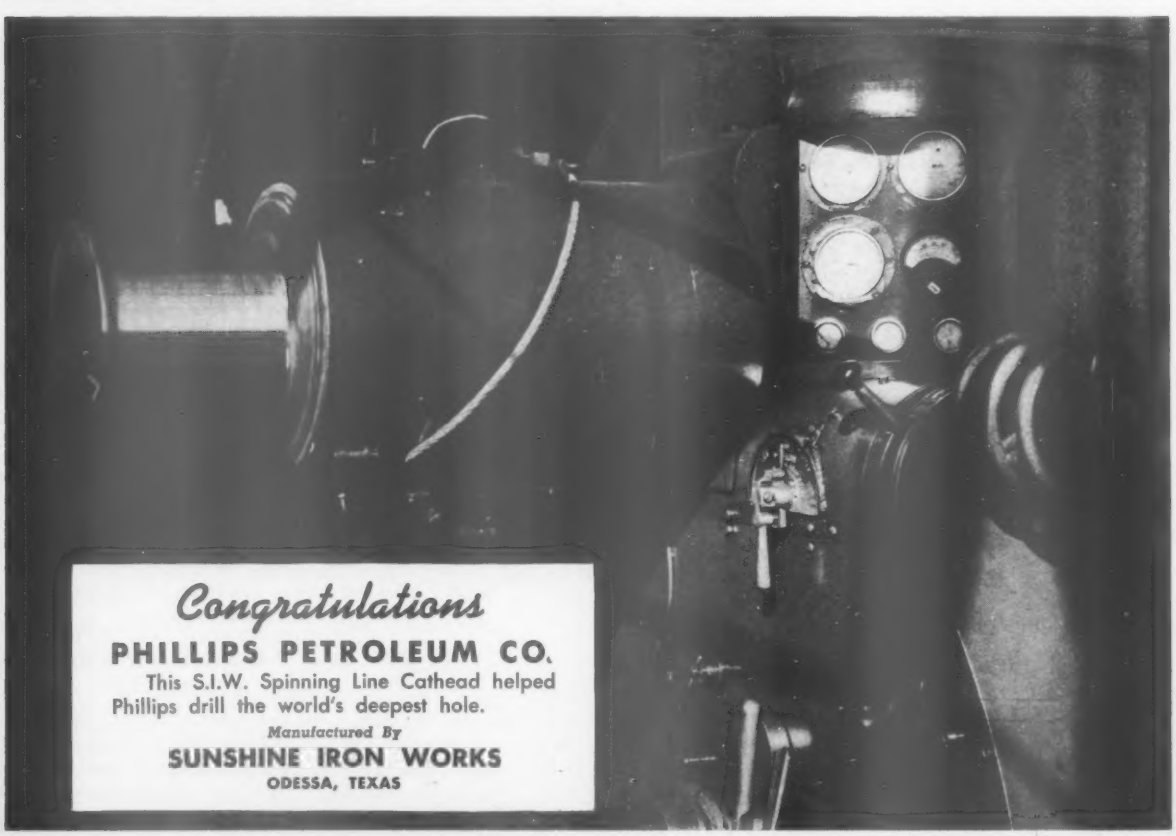
"Wore out two bits and made 8 in. Out of hole to change bits."

The men on the job stopped thinking of themselves as drillers or roughnecks, but as participants in an endurance contest with tongs and pipe. Glen Whitman moved a bed roll and some groceries out to the location and "holed up" for the duration of the chert. An occasional donation of a kid or a lamb by one of the ranchers broke the monotony with a barbecue. Symbolic of their digging difficulties was the little red fox that one of the crew members caught one day when the job was going particularly bad. He chained it as a mascot, and while the chert kept up its devilish resistance the fact that it was finally drilled through indicated a certain amount of luck. One day, almost simultaneously with the change in formation, the little animal made its getaway. No doubt he had served his purpose, and coming from a long line of diggers in the earth, instinctively knew it.




*Map of portion of West Texas area showing location of Phillips Petroleum Co. 1 Price in Pecos County and its relation to other fields*

At a little past 13,000 ft. the last of the chert gave way. The drilling report began to look up. "Last 5 ft. made in 2½ hours; last foot in 25 minutes." The next 1,754 ft. were accomplished with only 27 bits, or approximately one-fourth the average number required for an ordinary well. When the drill pipe buzzed past the record depth mark of 15,004 ft., bits were making 50 to 150 ft. and the men got so they whistled a tune.

# REFINING

## Research Affiliate Created By California Standard

LOS ANGELES.—California Research Corp., a subsidiary of Standard Oil Co. of California, has been organized to take over the parent company's patent department and its research and development department. The new affiliate will begin operation May 1 in San Francisco, with R. G. Follis chairman of the board, and R. A. Halloran president. It will conduct research and technical development for all California subsidiaries, including Oronite Chemical Co., developing a wide variety of petroleum products and chemicals, and will study peacetime uses for war plants and processes.

The new company's primary purpose is to unify and place still more resources at the disposal of Standard's expanded program to improve products now used by the Army and Navy and to devise new weapons and processes. For the future, Standard plans California Research as a bridge to reconversion from wartime to peacetime operations.

Vice presidents are J. N. Adams, F. L. Craise, W. N. Davis, and Alois Kremser; secretary, Ewing Sibbett; treasurer, H. D. Armstrong; assistant secretary, G. M. Foster.

## Stories About Superfluous Gasoline Called Absurd

WASHINGTON.—Stories to the effect that West Coast refinery storage capacity is choked with an overabundance of motor fuel are characterized by Ralph K. Davies, acting petroleum administrator, as "false and absurd."

"Contrary to rumors," said Davies, "automotive gasoline stocks on the Pacific Coast are down very close to the minimum working levels required to keep the supply and distribution systems running smoothly and effi-

## CHEMISTRY'S LURE MADE HIM SWITCH CAREERS

FIRST intending to be a physician, Ralph A. Halloran, president of the newly organized California Research Corp., a Standard of California subsidiary, found the field of chemical engineering so fascinating at University of California that he switched. He graduated in 1906 and before joining Standard in 1907, worked as a timber evaluator and as a railroad surveyor.

Halloran's first job with Standard was as a chemist in the Richmond research laboratories, where he worked 7 years. Four years in the oil fields followed. Then came 2 years at El Segundo refinery, where he was in charge of operations and experimental cracking plants.

During the first World War Halloran was assistant fuel administrator for the Pacific Coast. In 1926 he was named manager of Standard's research and development department, which position he held until the appointment to his new post with California Research Corp.

Halloran is a director of the Coordinating Research Council, whose task is to correlate and study problems of the petroleum and automotive industries. He also is on the advisory committee on lubricants of the Petroleum Administration for War; a member of the technical advisory committee, Petroleum Industry War Council and a consultant for the War Production Board on the industrial research and development referee board. He is a member of American Chemical Society, American Society of Mechanical Engineers, Electro-Chemical Society and American Society for the Advancement of Science.

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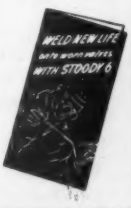


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*NITROSE* is a corrosion resisting application for metal surfaces—it is not to be confused with so-called "protective paints." *NITROSE* welds itself to surfaces to which it is applied, forming a bond which will not chip, crack or peel; expands and contracts with the surface covered, effectively resisting corrosive action of water, acid fumes, alkalis, brine and high temperatures.

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ciently. The automotive fuel being produced at refineries as a result of our maximization of aviation-gasoline production on the West Coast and from other sources is hardly enough to fill our civilian requirements, to say nothing of storage tanks. Any statements to the effect that there is an overstorage of the product are obviously absurd."

## Companies Adopt Rates for Refinery Use of Patents

WASHINGTON. — Cross-licensing, licensing, licensing terms, and patent-royalty rates to be charged American refiners using processes other than their own in the manufacture of aviation gasoline and toluene have been agreed upon by six oil companies, Petroleum Administrator Harold L. Ickes has announced. The six hold patent rights on fluid catalytic-cracking processes and hydrocatalytic reforming processes. The agreement was made under the terms of Petroleum Administration for War recommendation No. 41, issued July 24, 1942.

Parties to the agreement, which was granted a certification by the chairman of War Production Board as requisite to prosecution of the war, are: Shell Development Co., Texaco Development Co., Standard Oil Development Co., Standard Oil Co. (Indiana), Universal Oil Products Co., and M. W. Kellogg Co. Anglo-Iranian Oil Co. and International Catalytic Oil Process Corp. are not parties to the agreement, but will make their patent rights available under it.

Ickes said that about 40 units refining aviation gasoline and toluene under these patented processes are in operation or in process of construction. These plants were started after he had assured the six companies and their prospective licensees that an agreement on licensing terms and patent royalties would be made later.

"The companies that have agreed to make their patented processes available to a common pool should be commended for their fine spirit of cooperation," Ickes said. "When this nation was catapulted into war 2 years ago, it became imperative that we increase our production of aviation gasoline and toluene immediately. These important war products were, of course, required in large quantities. The requirements of the military were and still are being met. That this has been accomplished is due in large measure to the cooperation of these companies and other similar groups holding patents on important refining processes.

"The companies concerned have permitted other refiners to use their processes before agreeing to licensing terms and royalty rates. This was done solely on the assurance that, at some future date, agreements would be drawn up which would be satisfactory to the Government and to the companies involved, and their prospective licensees."

"Ordinarily patent royalties on a new and superior process are much higher than the royalty rates on the older processes which they are superseding," explained Deputy Administrator Ralph K. Davies. "In this case, however, we have arranged that the royalty rates on the new catalytic processes should be the lowest ever granted by owners of the older thermal cracking process patents. Since thermal cracking patent royalties were substantially reduced in 1938, this standard gave a very reasonable royalty rate to the licensees and to the Government."

## Clark-Babbitt Buys Madison Plant of Barber Asphalt

NEW YORK.—Properties, product rights and business of Barber Asphalt Corp.'s Madison, Ill., plant have been bought by Clark-Babbitt Industries, Inc. Babbitt-Barber Asphalt Products, Inc., has been organized to operate the business, with Theodore T. Toole, president; Lawrence G. McHugh, vice president and general manager; Daniel Needham, secretary.

## Ban on Fuel-Oil Deliveries To Eastern Tanks Lifted

WASHINGTON. — Petroleum Administration for War last week revoked an order issued February 16 prohibiting fuel-oil deliveries to large tanks on the East Coast already having more than a 10-day supply. Deputy Administrator Ralph K. Davies said the action was designed to help primary and secondary suppliers, jobbers, distributors, and large-scale consumers to stock as much fuel oil as their facilities can accommodate in the summer months and thus build up supplies for the next heating season.

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# PIPE LINES

## Stanolind Prepares for May Tank-Car Shipments

Stanolind Pipe Line Co. has been accumulating stocks of crude arriving through the West Texas 16-in. line to prepare for adequate handling of large tank-car shipments scheduled to start in May from the loading rack now being built at Cushing, Okla.

From deliveries of West Texas sour crude oil in May through the 16-in. line, estimated at 60,000 bbl. daily, 13,100 bbl. has been scheduled for tank-car shipment to District 2 refineries and approximately 30,000 bbl. to District 1. The remainder will move northward through the company's trunk-line system.

Shipments to District 2 in this program are expected to go to refineries at average daily rates as follows: Derby Oil & Refining Co., Wichita, Kans., 325 bbl.; National Cooperative Refinery Association, McPherson, Kans., 1,000 bbl.; Advance Refining Co., Centralia, Ill., 100 bbl.; Cascade Refining Co., Salem, Ill., 200 bbl.; Pana Refining Co., Pana, Ill., 150 bbl.; Wood River Oil & Refining Co., Hartford, Ill., 1,300 bbl.; Ashland Oil & Refining Co., Catlettsburg, Ky., 1,000 bbl.; National Refining Co., Findlay, Ohio, 500 bbl.; Globe Oil & Refining Co., Lemont, Ill., 6,500 bbl.; Johnson Oil Supply Co., Gary, Ind., 675 bbl.; Lakeside Refining Co., Kalamazoo, Mich., 100 bbl.; Marvel Refining Co., Grand Rapids, Mich., 100 bbl.; Midwest Refineries, Inc., Alma and Grand Rapids, Mich., 150 bbl.; Old Dutch Refining Co., Muskegon, Mich., 200 bbl.

## Wisconsin Extension of Chicago Line Proposed

Federal Power Commission will hold a hearing May 11 on applications filed by Wisconsin Southern Gas Co., Chicago, asking the commission:

1. To order Natural Gas Pipe Line Co. of America to extend facilities to connect with the applicant's proposed facilities near Genoa City, Walworth County, Wisconsin, and to sell and deliver natural gas to meet the demands on the applicant's system.

2. To issue a certificate of public convenience and necessity to authorize the applicant to construct and operate approximately 10 miles of 4-in. pipe line extending from the city of Lake Geneva, Wis., to the Wisconsin-Illinois State line near Genoa City, to connect the applicant's distribution system with the Natural Gas Pipe Line Co. of America's pipe-line facilities.

The FPC order consolidates proceedings for the purpose of hearing and provides that interested state commissions may participate in the hearing.

Permission to intervene in the proceedings has been granted by FPC to several coal and dock organizations.

## Kansas-Nebraska 156 Mile Line Approved by FPC

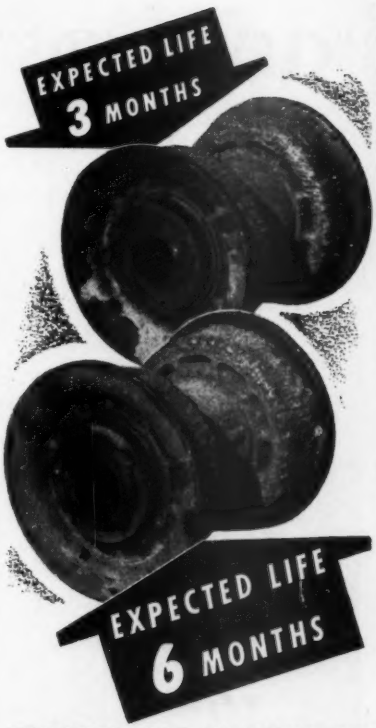
Federal Power Commission has authorized Kansas-Nebraska Natural Gas Co., Inc., with principal offices in Phillipsburg, Kans., and Hastings, Neb., to construct and operate a 156-mile natural gas pipe line and appurtenant facilities in Kansas. The order provides that the company shall commence construction before June 1, 1944, and complete the facilities not later than December 31, 1944.

The proposed construction includes (1) a 41-mile 18-in. pipe line, Kearny County, Kansas, to the company's Scott City compressor station; (2) 100 miles of 12¾-in. pipe line from the Scott City compressor station to a point about 15 miles southwest of the company's Stockton compressor station; (3) about 15 miles of 8⅝-in. pipe line running from this point to the Stockton station, and (4) four additional 500-hp. compressor units to be installed in the Scott City compressor station, and appurtenant facilities.

The Kansas-Nebraska company has received from the state Corporation Commission of Kansas authority for issuance of securities for such portion of construction cost as cannot be supplied from current funds.

## Panhandle Eastern Hearing Is Postponed to May 17

WASHINGTON. — Federal Power Commission has postponed to May 17 its hearing on applications of Panhandle Eastern Pipe Line Co., Kan-

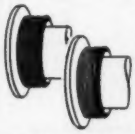

STOODY SELF-HARDENING MAKES THE DIFFERENCE!

ABOVE are two reclaimed rollers taken from the same tractor. The upper roller was rebuilt to size with high carbon electrodes alone, but the lower roller carried a protective layer of Stoody Self-Hardening over the high carbon build-up*.

Abrasive conditions encountered in tractor operation were so severe the top roller was worn out in three months' time. The Stoody Self-Hardening, however, kept the lower roller in operation for another three-months period, a life increase of 100%!

Cost of the Stoody Self-Hardening deposit can be ignored, considering benefits obtained and the time saved in eliminating an extra overhaul.

Hard-facing can be applied either of two ways: (1) A bead run around the outer edge and space between the bead and collar filled in with horizontal welds or (2) A bead around the outer edge to bring the roller back to diameter, and intervening area between outer edge and collar filled with a continuous spiral of hard metal. Either method is equally successful but the latter has the advantage of more easily maintaining roller concentricity.



Have you received your copy of Stoody Specification Sheets? They illustrate and describe dozens of equipment-saving applications thru the use of hard-facing—sent free on request.

*The preliminary high carbon build-up can be eliminated if Stoody Self-Hardening is applied before excessive wear has occurred on the roller.

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sas City, Mo., for permission to construct and operate additional natural-gas pipe-line facilities extending from the company's Michigan West Line, in Calhoun County, Michigan, to points near the city limits of Albion, Mich. The hearing had been set for April 19.

## Bids Due Early in May for Stanolind's Wyoming Line

Contractors are making preliminary investigations preparatory to submitting bids for laying Stanolind Pipe Line Co.'s 240-mile 12-in. crude-oil line from Elk Basin to Casper, Wyo. Bids will be submitted early in May for the undertaking, which will be handled by three spreads working in sections of approximately equal length. Pipe deliveries are scheduled to commence in May. The project is to be completed in September. Bids have been asked for the communication system. Ground surveying is in progress this week.

## Ohio Oil Lays 14-in. At Hartford, Ill.

Ohio Oil Co., pipe-line division, is laying 2½ miles of 14-in. crude-oil line from a dock near Hartford, Ill., on the Mississippi River, to the company's Wood River pump station. Through the line oil is to be handled which will come by barge for the accounts of Standard Oil Co. of New Jersey and other interests.

## Aerial Survey Completed for Everett-Methuen, Mass., Line

Following an aerial survey the route has been staked for Colonial Beacon Oil Co.'s 34-mile 4-in. and 6-in. Everett-Methuen, Mass., products line, which will be started in May. It is reported that 8 miles of New England Power Co.'s right-of-way will be used. Right to cross parkways in the Everett area is being sought from state officials.

## Fines Imposed for Rioting On Tennessee Gas Line

GRAYSON, Ky. — Circuit Judge R. C. Littleton imposed fines of $2,000 against six men indicted for assault and battery and destruction of property as a result of violence at the Tennessee Gas & Transmission Co. Texas-to-West Virginia pipe line project at Mount Savage, Ky., March 27.

Commonwealth's attorney J. Blaine Nickell, said indictments charging confederating and banding were still pending, but the cases were continued until the August term of court. The arrests were made after an outbreak between union and nonunion workers while equipment was being unloaded from railroad cars at Mount Savage.

Over 600 men will be hired to construct a section of the pipe line between Prichard and Cornwell, W. Va., according to J. R. Horrigan, contractor. Most of the workers will be hired in the local area, he said.

All but 100 key men will be employed through the Huntington, W. Va., U. S. Employment Service Office, and work will begin this month.

From Agua Dulce to the Big Sandy River 24-in. pipe is to be laid. The line will be 20-in. from Prichard to Cornwell. Horrigan estimated that crews working on the line in Texas, Louisiana, Mississippi, Tennessee and Kentucky number more than 8,000 men.

## Results of Employe Bargaining Elections

National Labor Relations Board has announced that production and maintenance employes of the Oklahoma division of The Texas Pipe Line Co., Tulsa, chose Oil Workers International Union (C.I.O.) as their bargaining agency.

Of approximately 149 eligible voters, 116 cast valid ballots, of which 83 were for Oil Workers International Union and 33 against. Six ballots were challenged but since they could not affect the results of the election no steps concerning them were taken, the labor board added.

NLRB held that no collective bargaining representative had been selected by a majority of employes of the San Antonio district, Texas, of United Gas Pipe Line Co. of Shreveport, La.

The board dismissed a petition for investigation filed by the oil workers union. The board said it had been decided that 14 employes to whom no ballots had been mailed in a recent election were temporary employes and therefore ineligible to take part in the election.

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# Exploration and Drilling

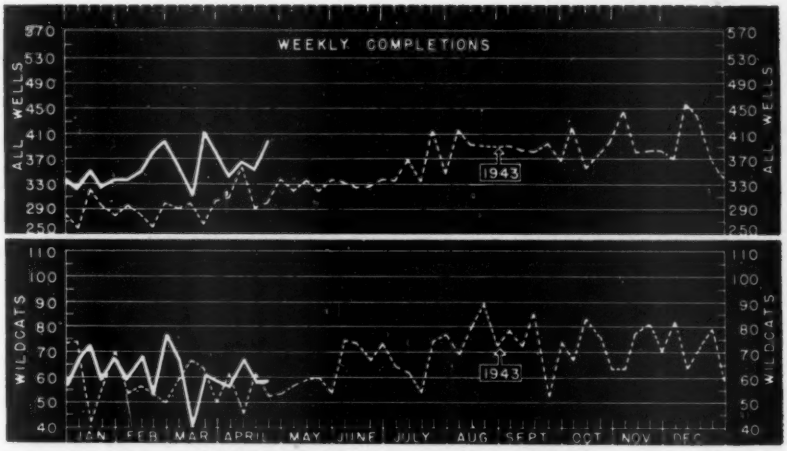
## Week's Highlights

THE West Edmond and the West Moore fields in Oklahoma and Cleveland counties, respectively, in Oklahoma, have developed far enough to stir up an intense interest among certain geologists, who begin to suspect that there is a possibility of one enormous oil field developing that might stretch in a broad sweeping arc from West Edmond south to and including the approximate present West Moore field, but in which the major production would come from the Hunton lime.

Other geologists are not willing to take in such a breath-taking possibility, but argue that there is every indication that West Edmond may develop a large area of Wilcox production north of the Hunton area and that there are possibilities of another Wilcox area, possibly several areas south of the present Hunton production.

The basic reason for this difference of opinion, and at the same time the agreement about enormous potentialities, lies in the fundamental geologic conditions. West Edmond is called a "stratigraphic trap" and West Moore may well prove to be the same thing. But when all is said and done, "stratigraphic trap" is just an expression that means that oil has been found in a place where the word "structure" hardly fits the conditions.

It is now obvious that oil will be found at several places basinward from the Nemaha ridge, where thinning of the section brings appropriate porosity in a reservoir bed in juxtaposition with appropriate source beds. Those who argue for Wilcox bumps both north and south of the Hunton production at West Edmond point out that the Bois d'Arc section of the Hunton produces through about 350 ft. of dip along the strike, but pinches out completely in a drop of 50 ft. across the strike, but with indications that this is merely a slight reentrant, beyond which there will be another high, and that the Bois d'Arc may well disappear from this high, leaving a substantial area of potential Wilcox production. They also argue that cross sections and study of the thinning, indicate similar possibilities south and southeast of the present Bois d'Arc production.




*Solid line charts current weekly completions*

### COMPLETIONS IN ALL FIELDS . . .

(Week ended April 22, 1944)

| | Oil | Gas | Dry | Total | Footage | Total Comp. to date 1944 | 1943 |
|---|---|---|---|---|---|---|---|
| N. Y., Penna., W. Va. | 33 | 18 | 2 | 53 | 98,479 | 1,001 | 949 |
| Ohio | 3 | 3 | 9 | 15 | 43,981 | 280 | 226 |
| Indiana | 0 | 0 | 0 | 0 | 0 | 67 | 76 |
| Kentucky | 1 | 24 | 9 | 34 | 99,263 | 189 | 95 |
| Illinois | 17 | 0 | 9 | 26 | 62,603 | 480 | 553 |
| Michigan | 0 | 0 | 5 | 5 | 12,434 | 156 | 128 |
| Kansas | 21 | 2 | 11 | 34 | 113,055 | 526 | 419 |
| Nebraska | 0 | 0 | 0 | 0 | 0 | 8 | 7 |
| Missouri-Iowa | 0 | 0 | 0 | 0 | 0 | 4 | 4 |
| Oklahoma | 18 | 2 | 14 | 34 | 109,250 | 456 | 339 |
| Texas: | | | | | | | |
| North Central Texas | 27 | 1 | 12 | 40 | 109,368 | 420 | 365 |
| West Texas | 30 | 1 | 6 | 37 | 158,737 | 448 | 261 |
| Texas Panhandle | 7 | 0 | 1 | 8 | 25,344 | 45 | 55 |
| Eastern Texas | 2 | 0 | 5 | 7 | 37,543 | 97 | 74 |
| Texas Gulf Coast | 16 | 3 | 9 | 28 | 195,858 | 230 | 114 |
| Southwest Texas | 3 | 0 | 2 | 5 | 16,915 | 234 | 262 |
| Total Texas | 85 | 5 | 35 | 125 | 543,765 | 1,474 | 1,131 |
| Louisiana: | | | | | | | |
| North Louisiana | 2 | 0 | 1 | 3 | 14,819 | 80 | 86 |
| Louisiana Gulf | 3 | 1 | 4 | 8 | 67,934 | 125 | 99 |
| Total Louisiana | 5 | 1 | 5 | 11 | 82,753 | 205 | 185 |
| Arkansas | 3 | 0 | 0 | 3 | 24,665 | 64 | 71 |
| Mississippi and Southeast | 0 | 0 | 0 | 0 | 0 | 43 | 23 |
| Montana | 3 | 1 | 2 | 6 | 10,695 | 68 | 52 |
| Wyoming | 3 | 0 | 0 | 3 | 17,495 | 44 | 37 |
| Colorado-Utah | 0 | 0 | 0 | 0 | 0 | 10 | 5 |
| New Mexico | 5 | 1 | 0 | 6 | 18,210 | 118 | 63 |
| California | 41 | 1 | 6 | 48 | 185,712 | 573 | 338 |
| Total United States | 238 | 58 | 107 | 403 | 1,422,360 | 5,768 | 4,701 |
| Total previous week | 208 | 32 | 114 | 354 | | | |
| Week ended April 24, 1943 | 176 | 29 | 98 | 303 | | | |

# Geology and Development of the Norman Wells Oil Field

*by J. S. Stewart**

THE Norman Wells oil field is located in the Northwest Territories of Canada, about 90 miles south of the Arctic Circle on the Mackenzie River. The discovery well, drilled in 1920 by a subsidiary of Imperial Oil, Ltd., found oil at a depth of 783 ft. was deepened later to 1,025 ft. and is now rated at 75-125 bbl. per day. The well has been produced irregularly, usually only for a few months out of the year.

In 1921 a dry hole which reported shallow gas shows was drilled to a total depth of 1,512 ft. This well was located about 8 miles upstream. In 1924 a dry hole was drilled on the western tip of Bear Island, about 3 miles from the discovery well, total depth 2,304 ft. This well now appears to be on the edge of the field. A dry hole was drilled this year about 4 miles southeast of the discovery well, on the south bank of the river, total depth 3,075. In 1925 the second oil well was completed at 1,602 ft., on a location only 150 ft. from the discovery well. This second well is now rated at 150-200 bbl. per day. In 1940 producers Nos. 3 and 4 were completed. No. 3 at a total depth of 2,702 ft., good for about 30 bbl. per day; No. 4, at a total depth of 1,330 ft., good for 100-140 bbl. per day.

In 1942 the Canol project of the U. S. Army took over and drilled 16 wells, 14 of which were oil wells and 2 were noncommercial wells. In the first 11 months of 1943, Canol project drilled 14 additional wells, 5 of which failed to produce commercial oil.

Summarizing, up to December 1, 1943, Canol project drilled 30 wells, of which 23 were oil wells and 7 dry holes. Of the 7 dry holes, 4 were wildcats and 3 were semiwildcats, near the edge of the productive area. In addition to the 23 Canol producers there are still the 4 earlier producers, making a total of 27 producers wells, as of December 1, 1943.

The productive area will probably cover over 5,000 acres, but about 3,000 acres lie under the Mackenzie River, of which perhaps half can be drained by directionally drilled wells. Because of the limited outlet, no adequate sustained test of the productive capacity has been attempted. The oil is apparently saturated with gas and is produced by natural flow. One of the best wells flowed wide open and produced 1,000 bbl. in 23 hours. Another well produced 875 bbl. in 19 hours, after acid treatment. This is flush production and cannot be expected to maintain itself under continuous operation. On the other hand, some of the poorer wells will make only 50 to 75 bbl. per day.

Production is obtained from a coral reef limestone formation in the Fort Creek section of the Upper Devonian. This limestone is a bioherm, and ranges from a few feet thickness along the margin to 425 ft., or more in the center. The entire thickness is not oil saturated, but, from the examination of a few core samples, it is thought that an average of 66 ft. of oil saturation over the entire area would be a fair estimate.

The reservoir pressure is abnormally high for the depth of the wells. The following are examples of bottom-hole pressures taken in wells that have been shut in for appreciable periods:

| Depth of well (ft.) | Bottom-hole press. (lb.) |
|---|---|
| 1,330 | 693 |
| 1,340 | 675 |
| 1,399 | 720 |
| 1,705 | 833 |
| 1,840 | 895 |

The abnormally high pressure suggests a water drive, but no appreciable amount of water has been encountered down the dip in edge wells. The lenslike nature of the reservoir, enclosed in shale, would also tend to discourage an active water drive from outside the field.

Wells are completed by cementing 5-in. casing in the top of the reservoir limestone, or by cementing through or partly through the limestone. In the latter case, the pipe is gun perforated at selected horizons and blank spaces left to act later as packer seats. This procedure is considered necessary to control the artificial gas drive that is planned. It is planned to inject gas under pressure at the crest of the structure to create a gas cap which will exert downward pressure on the oil and increase the oil recovery.

The wells drilled on Bear and Goose islands indicate that a large part of the field underlies the Mackenzie River, but wells cannot be drilled in the river bed because of flood and ice action. It is planned to drill directional wells to reach out beneath the river from the shore. One such well has been been completed, 3 Bear Island, at a slant depth of 2,394 ft., true depth 2,091 ft., with a horizontal drift of 970 ft.

The crude has the following characteristics:

*Liaison officer at Fort Norman, Geological Survey, Department of Mines and Resources, Dominion of Canada. This is an abstract of a paper presented in March at the annual general meeting of the Canadian Institute of Mining and Metallurgy at Toronto. The full paper may be found in the Institute's "Transactions, Vol. 47, 1944." Address 906 Drummond Building, Montreal.

## DAILY AVERAGE PRODUCTION FOR WEEK

| | Apr. 22 crude oil | Distillate, allied products | April PAW quota, all oils | Apr. 15 crude oil |
|---|---|---|---|---|
| Arkansas | 79,500 | 5,000 | 81,700 | 79,550 |
| California | 833,750 | 47,000 | 876,400 | 829,450 |
| Colorado | 7,750 | ..... | 7,000 | 7,950 |
| Eastern | 72,400 | 8,600 | 81,000 | 78,600 |
| Illinois | 201,900 | 13,000 | 228,000 | 214,900 |
| Indiana | 14,200 | ..... | 13,600 | 15,000 |
| Kansas | 263,800 | 5,800 | 290,800 | 272,300 |
| Kentucky | 22,300 | 2,700 | 25,700 | 20,300 |
| Louisiana | 358,550 | 34,000 | 381,700 | 358,500 |
| North Louisiana | 76,050 | ..... | ..... | 76,100 |
| Louisiana Gulf | 282,500 | ..... | ..... | 282,400 |
| Michigan | 48,500 | 300 | 53,300 | 52,560 |
| Mississippi | 42,750 | ..... | 45,000 | 40,800 |
| Montana | 21,900 | 300 | 24,300 | 23,050 |
| Nebraska | 1,200 | ..... | 1,000 | 1,200 |
| New Mexico | 111,850 | 4,900 | 116,600 | 112,650 |
| Oklahoma | 335,550 | 28,000 | 356,000 | 331,900 |
| Texas | 1,910,350 | 127,000 | 2,043,000 | 1,910,250 |
| East Texas | 362,300 | ..... | ..... | 362,500 |
| West Texas | 374,000 | ..... | ..... | 373,900 |
| North Central Texas | 143,850 | ..... | ..... | 143,800 |
| East Central Texas | 127,200 | ..... | ..... | 127,250 |
| Texas Panhandle | 91,200 | ..... | ..... | 91,100 |
| Texas Gulf | 716,800 | ..... | ..... | 716,700 |
| Southwest Texas | 95,000 | ..... | ..... | 95,000 |
| Wyoming | 99,150 | 6,900 | 99,900 | 88,660 |
| Total United States | 4,425,400 | 283,500 | 4,725,000 | 4,437,620 |

Total production January 1-April 22, 1944 ..... 497,146,961 bbl.
Same period last year ..... 435,734,770 bbl.

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GUN PERFORATOR
COMPLETION METHODS
Brown Line Print No. 7

# Set Thru

## TO PROTECT SECONDARY ZONES FOR FUTURE PRODUCTION

Set the casing through the oil and gas zones and cement it solid. Then gun perforate the selected zones.

The solid cement sheath eliminates water trouble, prevents migration of fluid between zones, and protects and supports the casing. Because production comes only from the selected zones which are gun perforated, gas/oil ratios can be controlled.

When production from the primary zones declines, secondary oil or gas zones can be opened by gun perforating in the order and to the extent required. If it is desirable to close off the zones previously gun perforated, the cement sheath prevents migration and gives good anchorage for cement placed by squeezing. Re-working of any nature is easy and economical because the well is full-diameter to bottom.

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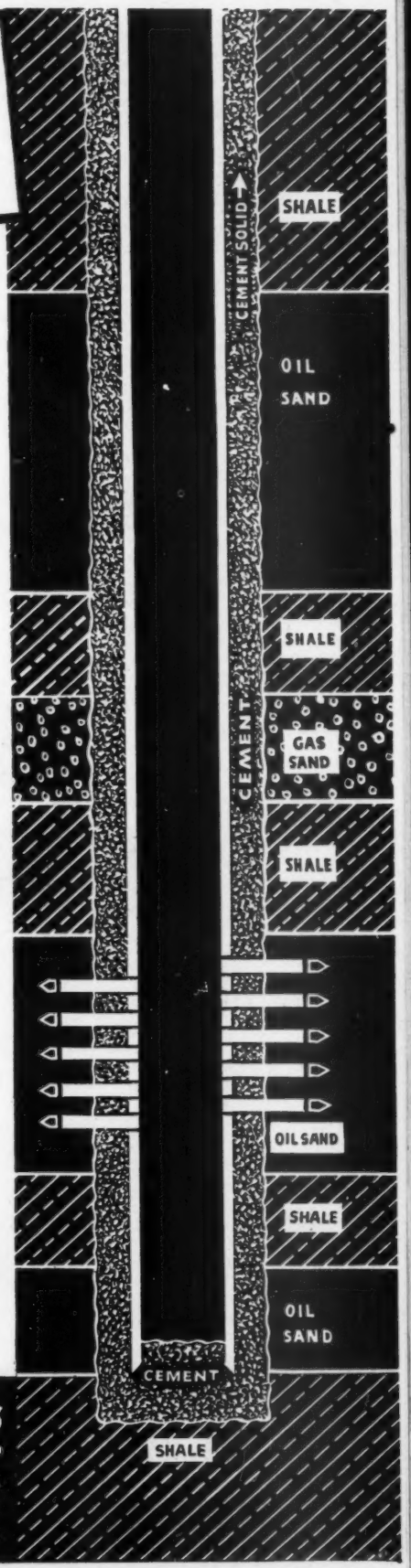
# McCullough
## GUN PERFORATOR




**21 SERVICE LOCATIONS**

McCULLOUGH TOOL COMPANY . . . 5820 South Alameda Street, Los Angeles 11, California

HOUSTON, TEXAS
WICHITA FALLS, TEXAS
VICTORIA, TEXAS
CORPUS CHRISTI, TEXAS
GEO. WEST, TEXAS
ODESSA, TEXAS
TYLER, TEXAS
McALLEN, TEXAS
ALICE, TEXAS
MAGNOLIA, ARK.
NEW IBERIA, LA.
SHREVEPORT, LA.
HOUMA, LA.
LAKE CHARLES, LA.
OKLA. CITY, OKLA.
SEMINOLE, OKLA.
CASPER, WYO.
LOS ANGELES, CALIF.
VENTURA, CALIF.
BAKERSFIELD, CALIF.
AVENAL, CALIF.
SACRAMENTO, CALIF.

| | |
|---|---|
| **Base of crude** | Intermediate (wax-bearing) |
| **Gravity** | 38.4 A.P.I. |
| **Sulfur** | 0.55% (by weight) |
| **Pour point** | Below —60° F. |
| **Viscosity seconds:** | |
| Saybolt Universal at 70° F. | 41.6 |
| Saybolt Universal at 15° F. | 88.0 |
| Saybolt Universal at 0° F. | 142.0 |
| Saybolt Universal at —15° F. | 239.0 |
| Saybolt Universal at —30° F. | 525.0 |

Due to drop in temperature and pressure, wax deposits around the well heads and separator tanks, but clogging of the flow lines to the batteries and storage tanks is prevented by running steam tracer lines alongside the flow lines. Most of the wax is thus carried through to the storage tanks, where cooling causes deposition of wax, which is periodically drained off. It is thought that wax remaining in the crude when it leaves storage tanks will be deposited in the first 25 miles of pipe line and can be removed by pumping a mechanical scraper through the line.

All production is by natural flow from well heads to a separator at the central tank batteries, from which the oil goes into field storage tanks. At present, the gas separated from the oil is used as a fuel for heat and power and the excess is "popped" into the air. Later all gas available will be repressured and forced back into the reservoir.

### Estimate of Reserves

The size of the field is estimated at over 5,000 acres, but not more than 4,000 acres will be drainable because the river interferes with regular spacing of wells. A conservative estimate of the porosity would be 15 per cent of the estimated average 66 ft. of saturation. It is estimated that connate water will occupy 20 per cent of this pore space. Under open-flow production, only 20 to 25 per cent of the oil would likely be recovered; under repressuring, recovery may run from 35 to 50 per cent. A 40 per cent recovery seems a fair estimate. However, when the oil reaches the surface, the loss of gas due to pressure drop and shrinkage of oil volume due to temperature drop causes a volume loss of 15 per cent from the volume occupied under underground reservoir conditions.

On these assumptions, an estimate of 83½ million barrels of recoverable oil can be arrived at. Examination of the conditions and assumptions on which the estimate is based will show that it is possible to arrive at quite a different estimate by changing slightly some of the assumptions within reasonable limits.

The figure 66 ft. for average thickness of saturation is calculated from too few samples and may be subject to change. The thickness of the oil-saturated zone varies considerably. The porosity of 15 per cent is also based on too few samples and the average may be greater or less. The percentage of oil recoverable is based on experience and is an assumption. The estimate for connate water is pretty much of a guess. The shrinkage can be calculated from pressure, temperature, and gas content. The drainable productive area is based on facts: the location of wells and the geological structure.

Although the drainable productive area is estimated at 4,000 acres, it is quite likely that, over a large part, the artificial gas drive will not be effective and the per cent recovery will be much less than indicated in the above calculation. The effectiveness of the gas drive will be handicapped by the massive, irregular bedded nature of the reservoir and the course of the river interfering with regular spacing of wells will make it impossible to spot gas-input wells in the most effective pattern. A more reasonable estimate of ultimate recovery would then be roughly 40 per cent over 2,000 acres, or 42 million barrels, plus 20 per cent recovery over 2,000 acres, or 21 million barrels, giving a total ultimate yield of 63 million barrels.

In the early stages of development of an oil field, the information is too scanty to make accurate forecasts of the ultimate recovery. The flush production from wells in the early stages of development is always much greater than the rate of settled production. It therefore tends to make the picture too rosy and leads to overestimation of the oil reserves.

Republic National Bank of Dallas
announces the appointment of
JOHN R. SCOTT
to the Petroleum Department

Formerly of Skelly Oil Company, Mr. Scott has been engaged in the Petroleum Industry for 18 years.

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# LOUISIANA GULF

## Continental to Test Showings At East Moss Lake

NEW ORLEANS.—Sun Oil Co. was running potential test at the close of the week in its new South Louisiana oil discovery in the Cankton area of St. Landry Parish. Total depth of 1-B Boagni estate is 10,512 ft., with casing set to 9,800 ft., and perforations made at 9,700 ft. Preliminary tests showed the well flowing at the rate of 18 bbl. per hour through a 12/64-in. choke with tubing pressure 1,800 lb. and gravity of the oil about 38°. No new locations have been announced.

Some interesting showings are to be tested in Continental Oil Co. 1 Prairie Land & Canal Co. at East Moss Lake in Calcasieu Parish. Total depth is 11,319 ft. with a plug set to 10,400 ft. A string of 7-in. casing had previously been set at 9,650 ft. and a string of 5-in. liner is now being set for tests of showings in the lower part of the hole.

The portion of the Lake Arthur field recently opened to good oil production by Union Sulphur Co. may now receive more rapid development with removal of restrictions imposed by Petroleum Administration for War as being primarily a gas-condensate area.

In the Lake Bully Camp area, La Fourche Parish, Gulf Refining Co. 6 Delta Securities has been completed as a producer, flowing at the rate of 208 bbl. daily through a ⅛-in. choke from perforations at 6,510-30 ft. Total depth was 7,092 ft.

Ohio Oil Co. has made location for a new wildcat in the Hope Villa area, East Baton Rouge Parish. Its 1 Fred Piker is to be located in 1-8s-2e, and will be carried to a depth of 9,600 ft.

**LOUISIANA GULF COAST WILDCAT COMPLETIONS**

Acadia Parish: Barnsdall Oil & Ref. Co. 1 J. Fusilier, 38-7s-3w, dry at TD 9,580 ft.

# N. CENTRAL TEXAS

## Good Well Added at Vogtsberger Extension Area

WICHITA FALLS. — Fain & McGaha 2 Emma Thorman, Section 11, Block 1, H&TC Ry. Survey, in the southeast extension area of the Vogtsberger pool, northeastern Archer County, was completed as one of the best wells in the pool. Topping the pay at 4,674 ft., the well flowed 171 bbl. oil in 6 hours through ½-in. choke, rating a daily potential of 684 bbl. per day. The pay was shot with 300 qt. at a total depth of 4,730 ft.

**King County.**—First showing of oil in the Gulf Oil Co. 1 Masterson, Section 1, E. L. Ribble Survey, was logged at 2,070-75 ft., going into dry lime after the showing, and was drilling ahead. In the Bateman Ranch area, Humble Oil & Refining Co. 4 Bateman had a show of oil at 5,350-57 ft., and had trouble with mud pump delaying test. This well is below the pay of the discovery well, which had pay 3,682-3,703 ft. No. 5 Bateman, 1,320 ft. north of No. 1, has slush pit dug ready to spud.

**Cooke County.**—Magnolia Petroleum Co. 1 Sallie Long, north of the discovery at Horse Shoe Bend, was shut down for repairs at 5,655 ft., drilling deeper after missing the pay in the discovery well. Strawn sand showing oil was drilled from 5,538-49 ft.

**Montague County.**—Continental Oil Co. 1 Hundley, Martindale Survey, near Mallard, had Caddo lime at 6,009 ft., drilling conglomerate showing oil from 6,018-35 ft. The wildcat was drilling ahead below 6,103 ft. at last report.

**Clay County.**—Continental and Edge Oil Co. 1 W. D. Crockett, Section 3245, TE&L Survey, 1 mile east of Buffalo Springs and 5½ miles south by east of Stephens pool and the same distance south by west of the Wynn pool, will attempt to open Mississippi lime production.

Two wildcat locations were made in Jack County: Shell Oil Co., Inc. 1 Kattie Bell Carpenter is staked in J. Cook Survey, 9 miles northwest of Jacksboro and 2 miles west of Weir pool, and Continental 1 A. E. Sewell is staked in Wm. Montry Survey, 4 miles south of Jacksboro and 2¼ miles west of Worsham-Steed pool. Stanolind Oil & Gas Co. will drill a wildcat in northwestern Denton County, only ½ mile east of a failure to 5,633 ft. It is the company's 1 G. C. Dunn, in northwest corner J. Parks Survey, 5 miles west by north of Bolivar.

**NORTH TEXAS WILDCAT COMPLETIONS**

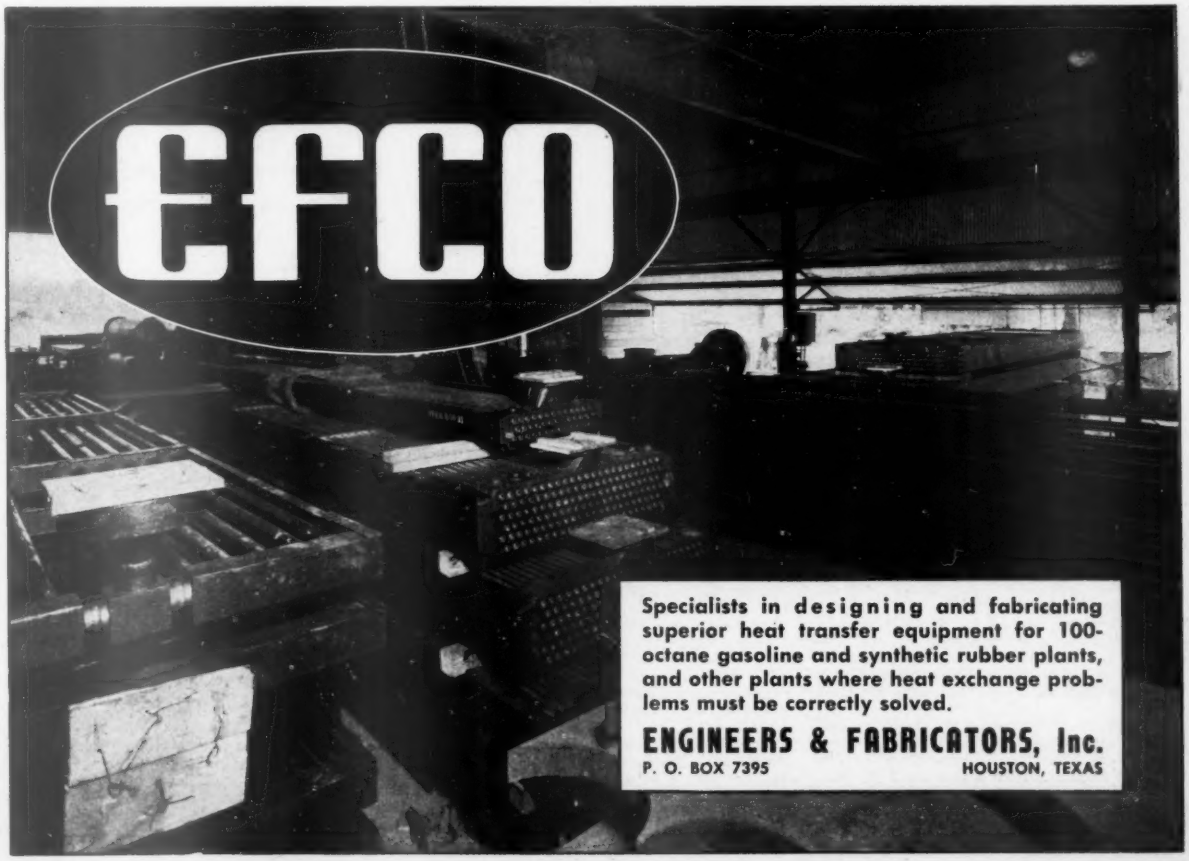
Clay County: C. D. Knight and J. W. Hastings 1 J. C. Schumaker, 600 ft. from NE, 200 ft. from SE, Blk. 12, Thornberry subd., dry at TD 1,335 ft.

Wilcox Oil & Gas-Continental Oil et al 1 G. W. Scaling, 8 mi. S Halsell pool, 960.48 bbl., perf. 5,554-70 ft., TD 6,160 ft. Discovery.

Wichita County: Oscar Donley 1 J. L. Bostic, 850 ft. from N, 330 ft. from W. Henry Hastie Sur., dry at TD 1,503 ft.

A. R. Dillard 1 Mrs. Ed Waggoner, 673 ft. from N, 6,415 ft. from E, 400-ac. lease, Robert Evans Sur., 14 bbl., TD 4,350 ft.

Fain & McGaha 1 C. R. Krizan, 495 ft.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from S, 495 ft. from W, 159.4-ac. lease, Blk. 43, Cherokee County School Land Sur., 336 bbl., lime, TD 4,950 ft. New pay in Davidson pool.

**WEST CENTRAL TEXAS WILDCAT COMPLETIONS**

Callahan County: Dean Bros. 1 H. P. Harris, 450 ft. from S and W, 200-ac. lease, Victoria County School Land Sur., dry at TD 909 ft.

Jones County: Fain & McGaha 1 Rex Smith, Sec. 3, Blk. 17, T&P Ry. Sur., 1 mi. N Patterson pool, dry at TD 3,966 ft.

S. C. Herring 1 J. D. Winkles, 330 ft. from N, 1,000 ft. from W, Sec. 3, C&M Sur., dry at TD 1,775 ft.

Taylor County: Humble Oil & Ref. 1 William Nolte, 660 ft. from S and W, 167-ac. tract, Guadalupe County School Land, dry at TD 3,530 ft.

# ILLINOIS

## Two Good Wells Extend Pools in Edwards, Richland

CENTRALIA. — The ½-mile extension of the Albion pool in Edwards County by Superior Oil Co. 1 E. Lambert et al, C S½ SE NW 31-1s-11e, which on its completion test flowed 873 bbl. in 24 hours from McClosky lime at 3,103-55 ft., at intervals, together with Pure Oil Co. 1 Rusk, C W½ SW SE 24-3n-8e, in the Shnell field, in Richland County, which flowed 757 bbl. initially from acidized McClosky lime at 2,980-3,011 ft., at intervals, were the best new wells of the week in the Illinois fields.

Seventeen oil wells and 9 dry holes were completed in the course of the week.

Thirty-eight new operations were begun during the week, including the following wildcats in eight counties: Kingwood Oil Co. 1 S. E. Cutshall, NW NW SE 14-3n-10e, Richland County: Skelly Oil Co. 1 Bass, NE SE NE 17-2s-14w, Wabash County; Magnolia Petroleum Co. 1 Peoples State Bank, NE SW NW 27-3s-6e, and Kingwood et al 1 J. Swader, 330 ft. from the north and 355 ft. from the east line, NW SE 2-5s-7e, Hamilton County; The Texas Co. 1 Rhodes Community, NW NW SW 14-3n-2e, Marion County; Bell Brothers 1 Avery Minor, C SW SE 25-1s-3e, Jefferson County; K. M. Boyer 1 J. Fred Berry, NE SW NE 8-1n-2w, Clinton County; J. E. Carlson 1 McDavitt, C W½ NE SW 32-13n-14w, Edgar County; H. Luttrell 1 Curry, NE NE NW 25-7n-5e, Effingham County, and Texas 1 G. J. Schumacher, NW NW NE 29-3n-4w, Clinton County.

**ILLINOIS WILDCAT COMPLETIONS**

Clay County: Texas 1 R. C. Kemmer, NW NE SE 34-4n-6e, dry at 3,082 ft., McClosky lime 2,952-3,014 ft. at intervals.

Gallatin County: Cherry & Kidd 1 Allan Gray heirs, NE NE SE 15-9s-10e, dry at 2,858 ft., lower Menard 1,814 ft., Cypress 2,360 ft., Benoist 2,490 ft., Benoist sand 2,510 ft., Aux Vases 2,656 ft., McClosky 2,766 ft.

Randolph County: O. P. Hughes 1 Wilson, C SW SW 23-6s-6w, dry at 757 ft., Palestine 45 ft., Menard 85 ft., Tar Springs 220 ft., Cypress 465 ft., Benoist 510 ft., Aux Vases 635 ft.

Wayne County: Pure 1 J. P. Molt A, SW SW NE 31-1n-8e, pumped 110 bbl. and 113 bbl. water from Rosiclare lime at 3,089-94 ft., acidized, TD 3,158 ft. Either a new pool or an extension to the Geff pool.

White County: Kingwood 1 M. Pyle, SW NW SW 2-7s-9e, dry at 3,394 ft., lower Kinkaid 2,219 ft., Cypress 2,924 ft., Benoist 3,060 ft., Aux Vases 3,213 ft., McClosky 3,328 ft., St. Louis 3,386 ft.

Williamson County: Superior Oil Co. 1 Sarah Pulley et al, SE NE NW 13-9s-3e, dry at 2,792 ft., lower Kinkaid 1,440 ft., Cypress 2,317 ft., Benoist 2,428 ft., Aux Vases 2,528 ft., McClosky 2,647 ft., St. Louis 2,776 ft.

# ROCKY MOUNTAIN

## Elk Basin May Be Unitized To Conserve Pressure

DENVER. — Representatives of operators in the Elk Basin field, meeting with the production committee of District 4, at Casper, Wyo., discussed proposals for unitization of the field to conserve gas pressure which is said to be declining rapidly. No program was outlined for immediate adoption, but a definite plan is expected to result from future conferences.

**Outpost at Elk Basin.**—Carter Oil Co. 2 Johnson, NE NE NW 8-57n-99w, completed in the Tensleep at 5,640-5,805 ft. for 567 bbl. per day, is an outpost in the Elk Basin field, a mile to the south of the nearest producer.

**Steamboat Butte discovery flows.** — British-American Oil Producing Co. 2-C Tribal, NE NE SE 31-4n-1w, Steamboat Butte field, Fremont County, Wyoming, a discovery in the Tensleep sand, flowed 251 bbl. of 29.7-gravity black oil a day from sand at 6,771-7,034 ft. It is preparing to go on the pump and is estimated at 1,000 bbl. In March 1943 British-American made a discovery on this structure in the Sundance horizon, the initial daily production being 635 bbl. The 2-C Tribal well is the first test to the deeper horizon.

**Fremont County lease play.** — Fremont County, Wyoming, has become a hot spot in the wildcat play. Forrest Stone, superintendent of the Wind River Indian Agency, is submitting for bids to be received at Fort Washakie on May 11, three tracts containing approximately 418,000 acres. The offer covers exploratory rights for 1 year which may be converted into oil and gas leases. One tract covering 144,000 acres lies principally to the west of the Steamboat Butte discovery and the Pilot Butte field, and south of the Circle Ridge and Maverick Springs field. Another tract, of 142,720 acres, lies principally between the Steamboat Butte and Maverick Springs pools. The third, covering 131,840 acres, lies to the east and northeast. The Winkelman dome, where Stanolind Oil & Gas Co. brought in a Tensleep discovery making 20 bbl. an hour through a choke 2 months ago, lies just to the south of the three blocks.

**Cooper Cove wildcat.** — Stanolind Oil & Gas Co. 1 Johnson-Parker, Cooper Cove dome, Carbon County, Wyoming, which showed 3,500 ft. of light oil in the Dakota sand at 4,850-93 ft., in a drill-stem test open 75 minutes, had negative results in the Lakota, topped at 4,931 ft., and is drilling ahead to the Sundance.

**Montana.**—The Blackfeet Indian Council has adopted a resolution authorizing entrance on tribal lands in the reservation for geophysical or geological exploration. The reservation, west of the Cut Bank field, is believed to contain promising structures.

**Colorado.**—The Gramps mystery oil field in Archuleta County, southern Colorado, discovered in 1935, has passed from under the shadow of secrecy as the result of an operating contract between the William E. Hughes estate and Oriental Refining Co. of Denver. Production is reported at about 1,000 bbl. per day and additional development is planned. Oriental will develop and operate the property, but did not acquire title.

The Gramps field was discovered, developed and produced by the William E. Hughes estate as a single unit on fee land, without any outside capital, and little information was given out concerning number of wells, depth or production. The same interests built and operated a refinery at Alamosa, Colo., under the name Gramps Oil & Refining Co. The plant had a daily skimming and cracking capacity of 1,000 bbl. The executor's report discloses that the Oriental, Arthur Putnam, R. K. Baker and E. M. Stringer, purchased the refinery for a reported consideration of $410,000 at the same time the contract was entered into for operation of the field. The Oriental has been operating the refinery for several years under a lease contract.

**WYOMING WILDCAT COMPLETIONS**

Steamboat Butte, Fremont County: British-American Oil Producing Co. 2-C Tribal, NE NE SE 31-4n-1w, TD 7,034 ft., flowed 251 bbl. per day from Tensleep sand at 6,771-7,034 ft., gravity 29.7 degrees, elevation 5,725 ft.

**MONTANA WILDCAT COMPLETIONS**

Midway, Pondera County: Hageman & Pond 2-X Rispen, SW NE NW 20-28n-1w, TD 1,769 ft., Sunburst 1,743-68 ft., show of oil at 1,757-61 ft., 800 ft. of water at 1,761-68 ft., plugged and abandoned.

R. C. Tarrant 1 Wiley-Edwards, NW NE NW 2-27n1w, TD 1,715 ft., PB to 1,675 ft., top Sunburst 1,655 ft., show of oil 1,667-91 ft., water 1,691-97 ft., show of gas in conglomerate sand at 1,706-15 ft., PB to 606 ft. to save as gas well, 100,000 cu. ft. at 570-575 ft.

## First Commercial Gas Field In South Dakota Reported

VERMILION, S. D. — The 1 Gertrude Schmitt, being drilled near Ardmore, Fall River County, by Woodward Oil Co. of Denver, has opened "what appears to be the first commercial gas field in South Dakota," according to Dr. E. P. Rothrock, state geologist. Doctor Rothrock said he had made rough measurements at the well and that these indicated a potential daily production of 500,000 to 1,000,000 cu. ft. of gas. Drilling was being continued.

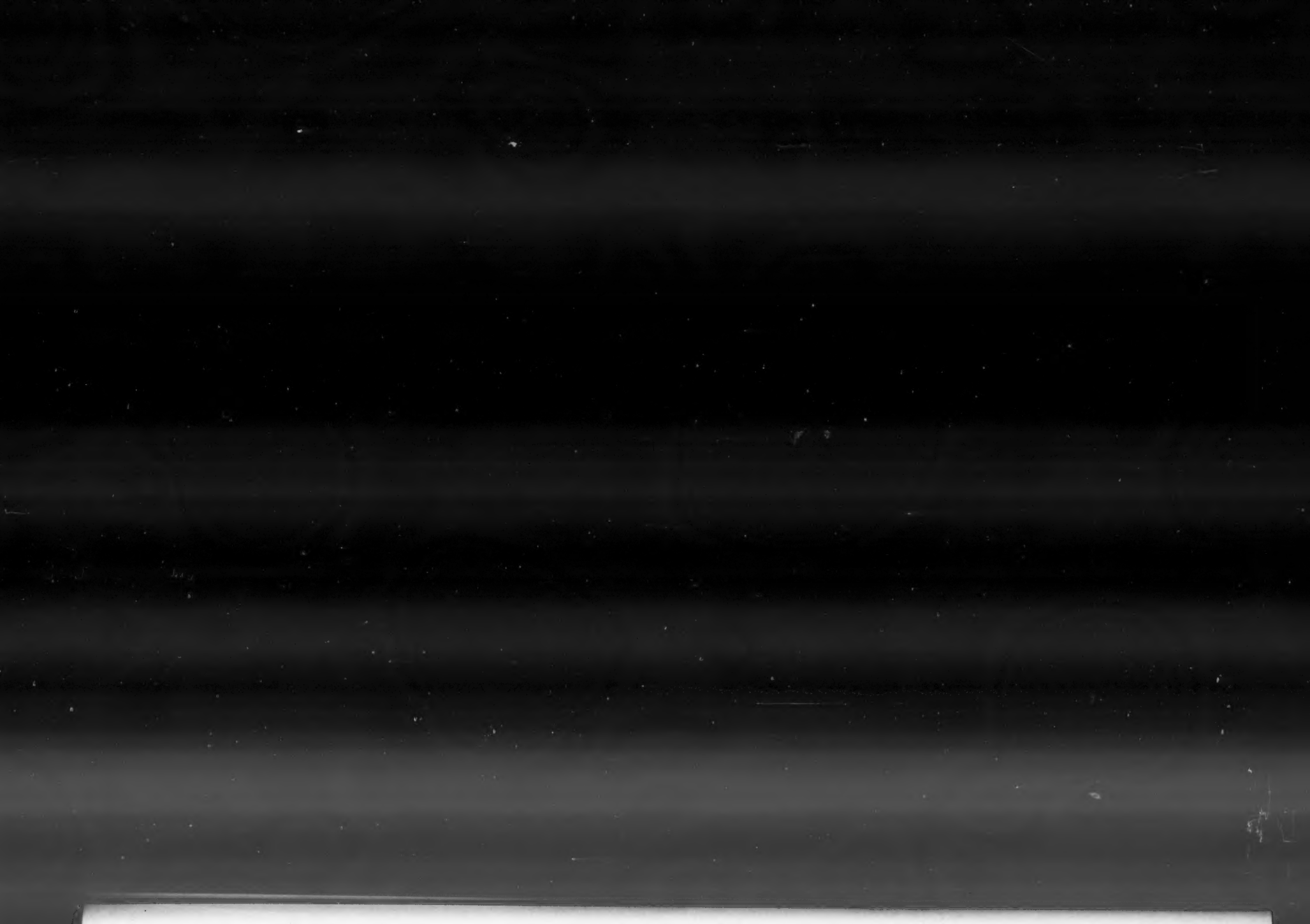
# CANADIAN FIELDS

## Gulf Increases Holdings In Southern Alberta

CHATHAM.—Gulf Oil Co. has taken out permit on 71,220 acres in Townships 11, 12 and 13, Ranges 3 and 4w5, in Southern Alberta, increasing its holdings to more than 390,000 acres. The new holdings are scattered over a distance of 45 miles from south of the Highwood River to near Lundbreck. Field work already done will be supplemented this spring by seismographic surveys, preparatory to drilling.

**Hutton.**—In the Hutton area, outpost section of the old Steveville field in the south-central Alberta plains, Riley-Lloyd 1, LSD 16, 5-23-11w4, finished 15 ft. in Devonian lime at 4,197 ft., with water in the formation. Shows in the overlying Madison lime will also be tested.

**Imperial operations.**—Output of crude oil, separator naphtha and natural gasoline produced in western Canada in 1943 by Imperial Oil and its subsidiaries, chiefly from the Turner Valley and Fort Norman fields, was 3,135,977 bbl. against 2,810,102 bbl. in 1942. In the Fort Norman field, the company drilled 12 wells, 11 being producers; and had a participating interest in 12 Turney Valley crude producers completed during the year. Of 17 unsuccessful exploratory wells, 11 were in Alberta, 2 in Saskatchewan and 4 in the North West Territories. The new plant at Calgary is now producing aviation alkylate of high-octane blending value to meet war requirements for aviation gasoline, and new units at Regina are further contributing to the supply.



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*...and in the future all pumps manufactured by*

**Fluid Packed Pump Company will be known by this name**

## *Here's why the name* oilmaster *aptly describes our pumps!*

A LONG RANGE development program . . . new improvements in pump design . . . new manufacturing processes have eliminated needless bulk of conventional designs and reduced pump prices—making our pumps master of all oil pumping problems. Some of the more important construction features that account for "Oilmaster's" greater pumping efficiency and economy are:

**One-piece Alloy Steel Barrels**—Reduce bulk, insure smoother pumping, less down time, fewer replacements—also insure against misalignment.

**Special Heat-Treatment of Barrels**—Produce barrels 4 to 8 times harder that wear 2 to 5 times longer than regular barrels.

**Mirror-Finish Precision Honing of Barrel Wearing Surfaces**—Provide smooth, effortless plunger operation under all conditions.

**Metal plungers equal to the barrel in abrasion and corrosive-resisting qualities**—result in minimum friction and wear.

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Annand-Hutchings Company
Cut Bank, Montana

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Oklahoma City 4, Oklahoma

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Forest Reserve, Trinidad, British West Indies

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## EASTERN TEXAS

### Stanolind's Tri-Cities Well Showing Distillate

DALLAS.—Stanolind Oil & Gas Co. 1-H Tri-Cities Unit, S. Sylvester Survey, extending the gas-distillate Tri-Cities pool northeast, showed an increasing flow of 68.5° distillate while testing. On last gage, it flowed 137.59 bbl. distillate with 1,362,000 cu. ft. gas through casing perforations at 7,667-81 ft., total depth 7,705 ft., with 5½-in. casing cemented at 7,681 ft. Delta Drilling Co. 1 Texas Pecan Nurseries, J. M. Arnest Survey, 5 miles south by west of Chandler, was drilling below 10,470 ft., topping Pettit zone with no shows at 10,310 ft.

**Rusk County.**—Another Pettit lime producer was registered for the Henderson pool. Beacon Oil & Refining 1 Busby flowed 229.6 bbl. through 15/64-in. choke after treating the pay zone with 2,000 gal. acid. The test is bottomed at 7,632 ft., logging top of Travis Peak at 7,526 ft. with no shows, cementing casing at 7,390 ft. Gravity of the oil tests 42.5°.

**Camp County.**—Mid-Continent Petroleum Corp. 1 McGahee, Harrison County School Land Survey, 4 miles northwest of Pittsburgh, had Gloyd porosity at 7,650 ft., and entered the Pittsburgh zone at 7,997 ft., with salt water showing in core from 8,001-12 ft.

**Upshur County.**—Hunt Oil 1 A. W. Tucker, ½ mile east of Simpsonville, was drilling below 6,058 ft., after coring white dry sand at 5,909-23 ft. This wildcat topped the Trinity series at 5,784 ft.

**Wood County.**—Attempt to extend the Manziel field 1 mile southwest, on trend toward the Quitman pool, ended in failure at Amerada Petroleum Corp. 1 Sheppard, S Burch Survey, which was abandoned as dry at total depth of 6,568 ft. New Paluxy wildcat for the county is Magnolia Petroleum Co. 1 Sallie Starr McGee, Lot 40, A. Gonzales Survey, 3½ miles west of Quitman field.

**EAST TEXAS WILDCAT COMPLETIONS**

Cherokee County: Continental Oil 1 Southern Pine Lumber Co., 330 ft. from N and E, M. Jones Sur., 10,000 ft. NE common corners Cherokee, Houston and Anderson counties, Pecan Gap 4,241 ft., salt water 5,366 ft., dry at TD 5,515 ft.

Falls County: W. T. Baresch 1 Pearl McCullough, 350 ft. from S and E, 218-ac. tract, 9,725 ft. E, 2,450 ft. S of SW cor. J. J. Acosta Sur., dry at TD 1,265 ft.

Hopkins County: H. L. Hunt 1 G. H. Marable et al, 330 ft. from N, 530 ft. from E, 40-ac. tract, J. C. Alexander Sur., 5 mi. SE Caro, elev. 541 ft., Georgetown lime 4,916 ft., Paluxy 5,890 ft., dry at TD 6,123 ft.

Lamar County: Cosden Pet. 1 W. T. Adams, 165 ft. from N and E, 10-ac. tract, Gibson Sur., 9 mi. NE Paris, granite 3,038 ft., dry at TD 3,064 ft.

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## SOUTHWEST TEXAS

### Continental Starting Series Of Tests in Goliad

CORPUS CHRISTI.—About 4 miles southwesterly from the Weser field, in Goliad County, Continental Oil Co. is starting a series of tests in its 1 Heard, originally a dry hole drilled by Sun Oil Co. Total depth is 9,003 ft., and casing was set and perforated for a series of tests of showings indicated on electric log. It recovered salt water on a test through perforations at 8,486-95 ft., but after a squeeze job and reperforating at 8,490-95 ft., it flowed 88 bbl. of 53-gravity distillate in 24 hours through a ¼-in. choke along with about 5 per cent salt water. Operators were squeezing off this set of holes at the close of the week before making another test.

Phillips Petroleum Co. is preparing to move in rig for its 1 West & McJeskill, a new wildcat in Zapata County. This proposed deep test is just across the Webb County line, south of the new gas discovery opened by the company in the Pescadito area. Gas from that discovery well is to be used in drilling the present wildcat.

In Bee County, W. Earl Bowe has made location for a wildcat, 1 Welder, 5 miles southwest of Blanconia, to be carried to a depth of 5,200 ft.

Standard Oil Co. of Texas will probably open a producing area in Jim Hogg County with completion of small pumper. Its 1 E. G. Canales, about 3 miles southeast of Crestonio, tested through a ⅛-in. choke for 7 days, flowing by heads at the rate of about 9 bbl. daily, then pumped about 10 bbl. of oil in 6 hours. It was preparing to acidize at time of latest report and will make another production test.

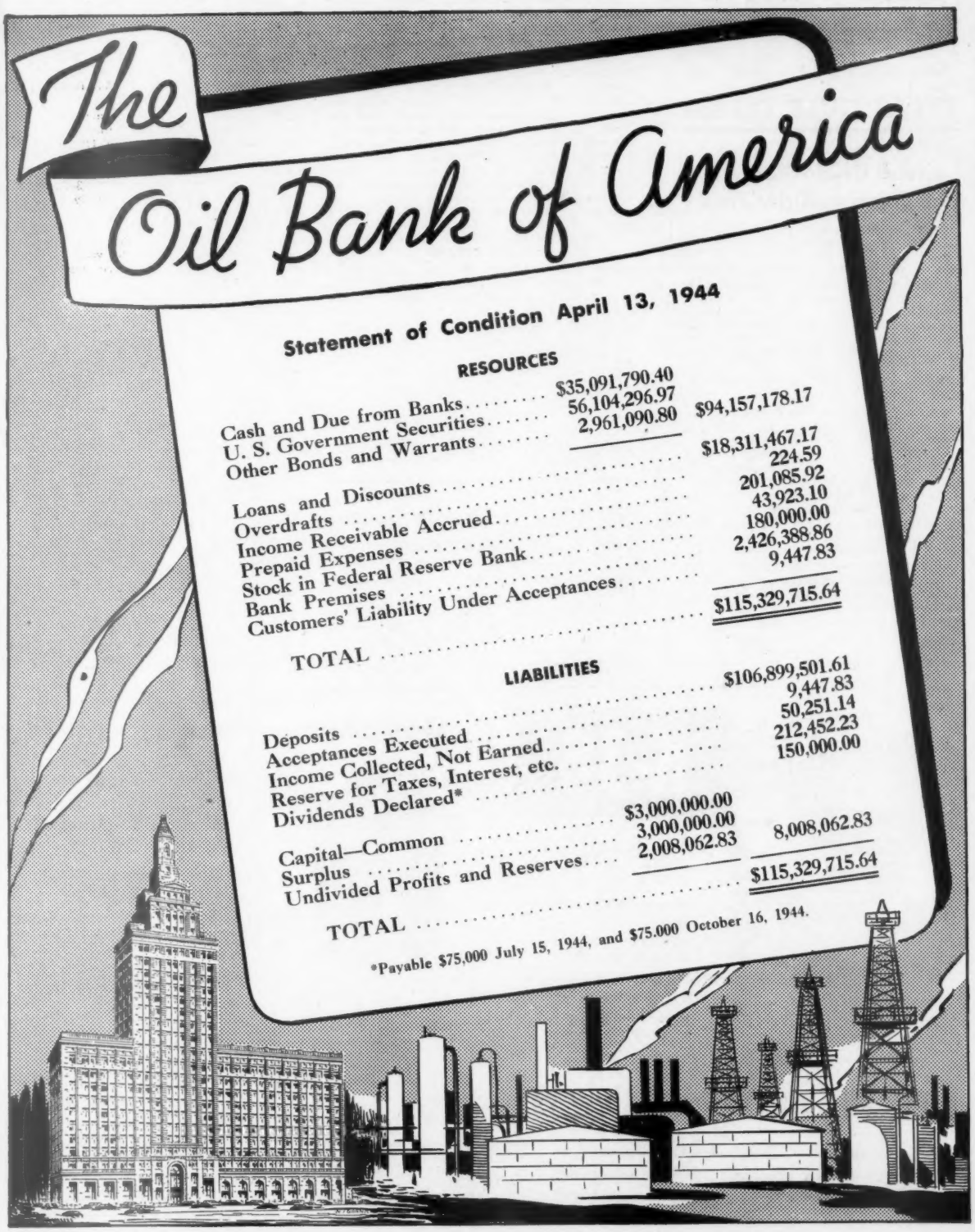
The Nomenclature Committee of the South Texas Geological Society has given the name "Los Indios" to the new field opened by Baldridge, King, and Nichols et al 1 King estate in Hidalgo County.

Arkansas Fuel Oil Co. 1 Buehrig, southwest of Myersville in De Witt County, is testing through perforations at 7,627-35 ft., where a drill-stem test flowed condensate at the rate of 5 bbl. hourly along with 3½ million cubic feet of gas daily through a ¼-in. choke.

**SOUTH AND SOUTHWEST TEXAS WILDCAT COMPLETIONS**

Jim Wells County: L. M. Josey, Rupert Cox & Dan L. Clark 1 R. B. Jackson, Magnolia City area, Joe Pacheco Gr., dry at TD 6,383 ft.

Victoria County: Rowan & Hope, Inc., 1


The Oil Bank of America
Statement of Condition April 13, 1944
RESOURCES
Cash and Due from Banks $35,091,790.40
U. S. Government Securities 56,104,296.97
Other Bonds and Warrants 2,961,090.80 $94,157,178.17
Loans and Discounts $18,311,467.17
Overdrafts 224.59
Income Receivable Accrued 201,085.92
Prepaid Expenses 43,923.10
Stock in Federal Reserve Bank 180,000.00
Bank Premises 2,426,388.86
Customers' Liability Under Acceptances 9,447.83
TOTAL $115,329,715.64
LIABILITIES
Deposits $106,899,501.61
Acceptances Executed 9,447.83
Income Collected, Not Earned 50,251.14
Reserve for Taxes, Interest, etc. 212,452.23
Dividends Declared* 150,000.00
Capital—Common $3,000,000.00
Surplus 3,000,000.00
Undivided Profits and Reserves 2,008,062.83 8,008,062.83
TOTAL $115,329,715.64
*Payable $75,000 July 15, 1944, and $75,000 October 16, 1944.

# NATIONAL BANK OF TULSA

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Rosena Wagner, 4 mi. E of Hord Creek area, dry at TD 4,505 ft.

Webb County: O. W. Killam 22 Garcia est., Mirando City area, Blk. 37, Sur. 592, Los Ojuelos Gr., dry at TD 2,206 ft.

# TEXAS GULF COAST

## General Crude Starting Campaign in Kirby Field

HOUSTON. — Opening of what may be one of the more important of recent coastal discoveries is being delayed by mechanical difficulties. Sun Oil Co. 1 Daugherty, northwest of Stowell field in Chambers County, flowed 7 bbl. of distillate in 5 hours on the first test. Gas-oil ratio is 40,123:1. Apparently an error in measurement caused perforations to be made in the gas rather than the oil column. Another test following a squeeze job is scheduled for this week.

General Crude Oil Co. is starting an active drilling campaign in the Kirby field, Liberty County. Its 1 Garbs, north end of the area, is being completed, flowing 91 bbl. of oil in 14 hours through a ⅛-in. choke from perforations at 5,960-6,010 ft. Locations have been made for 6, 7 and 8 R. A. Welch fee, all in the east end of a 956-acre lease in the Meredith Duncan Survey. The Railroad Commission has called a hearing for May 3 on the Kirby field to determine whether each of the A, B, and C zones are separate and distinct producing zones for which new pool allowables should be assigned.

Shell Oil Co., Inc. 1 Holderrieth unit, Spring Creek area of northern Harris County, is dry at total depth of 12,453 ft., well into the Wilcox formation, but with no details released regarding possible showings of oil or gas. This is one of the deepest tests drilled in this portion of the Gulf Coast area.

Cities Service Oil Co. has made location for another deep test in Colorado County, to test the Wilcox about 2 miles northeasterly from the company's Ramsey area discovery which produced condensate and gas from the Wilcox as a dual completion. It flowed a total of 250 bbl. of fluid daily from perforations at 8,320-40 ft. and 8,948-70 ft., but was shut in due to lack of pipeline outlet. Recently, a small amount of condensate has been trucked from the location.

**TEXAS GULF COAST WILDCAT COMPLETIONS**

Harris County: Shell Oil Co., Inc. 1 Wm. Holderrith unit, 2.7 mi. NE of Huffsmith, George Galbraith Sur., dry at TD 12,453 ft.

Montgomery County: Atlantic Refining Co. 1 South Texas Dev. Co., C. Beach Sur., Lot 66, Conroe area, dry at TD 10,708 ft.

Wharton County: W. Stewart Boyle et al 1 Claud Appling, 1 mi. W of Louise, dry at TD 6,007 ft.

# APPALACHIAN FIELDS

## South Penn's Lincoln County Test Is Dry in Oriskany

PITTSBURGH.—In West Virginia South Penn Natural Gas Co.'s test on the Austin Griffith farm, Duval district, Lincoln County, a former gas well in the Brown shale, was deepened through the Oriskany sand, which was dry. The Berea, or bottom of the Mississippian, was 2,280-2,306 ft.; Corniferous lime, 4,315 ft.; Oriskany, 4,391 ft.

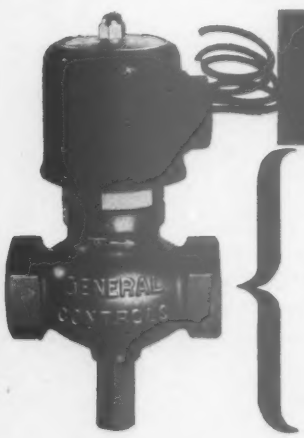
In Raleigh County, the deep test of Godfrey L. Cabot, Inc., on the C. E. Gwynn farm in Richmond district, topped the Corniferous lime at 6,180 ft., from a surface elevation of 1,294 ft., placing that member subsea 4,886 ft.

In Tucker County, the rotary test of The Ohio Oil Co., in the Kaemmerling tract on the Blackwater anticline in Dry Fork district, is drilling in the Oriskany sand at 8,024 ft. with the top of the sand placed at 7,978 ft. A core taken at 7,993-97, showed broken sand and shale probably the break between the A and B members. A second core taken at 8,016-20½ ft. showed hard limey sand with smaller crystals than the upper part. The hole will be drilled into the Helderberg before washing out and testing.

In Southwest Pennsylvaania on the Chestnut Ridge in South Union Township, Fayette County, Peoples Natural Gas Co. deepened 1 Piedmont Coal Co. to the upper Silurian and at 7,322-30 ft. there was an added 300,000 cu. ft. of gas definitely heavy with sulfur gas similar to and corelating with the sulfur gas in the old Booth & Flinn wells at Ligonier and in a formation similar to that found in Heyn 1. It probably will be plugged off and the well produced from the Onondaga chert beds.

In German and Luzerne townships, Fayette County, H. K. Porter et al completed two Injun sand wells. One, on the Minor Hartley farm, gaged 2,210,000 cu. ft. of gas at 2,050-54 ft. The other, on the Hecla Coal & Coke, gaged 2,610,000 cu. ft. of gas at 1,868-70 ft. Both show virgin rock pressures of 700 lb. and 620 lb., respectively.

In Clarion County, Pennsylvania Fuel Supply Co completed a fair test on the I. L. Brown farm in Porter Township, with a gage of 700,000 cu. ft. of gas from the Thirty Foot sand at 1,012 ft.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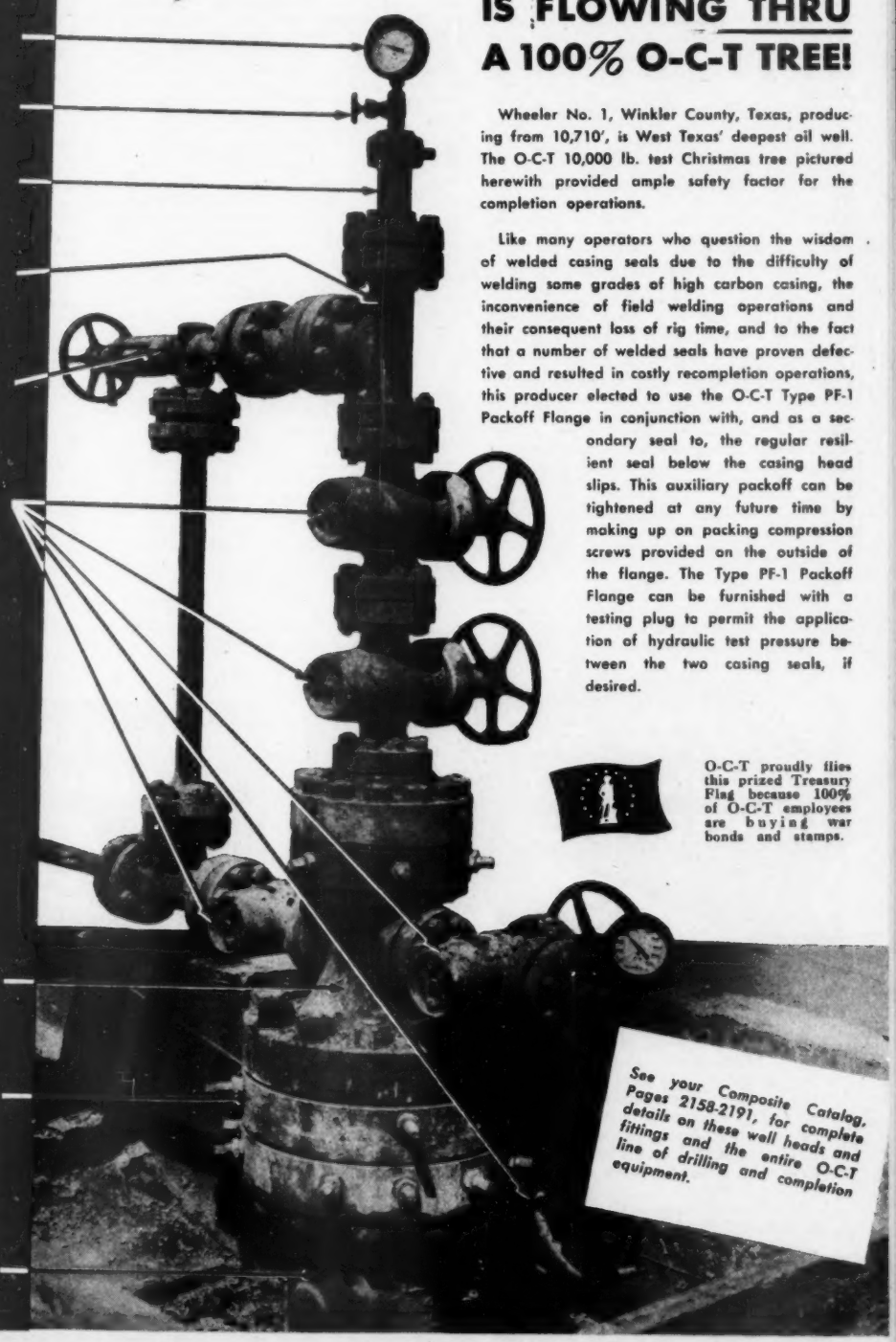

Wheeler No. 1, Winkler County, Texas, producing from 10,710', is West Texas' deepest oil well. The O-C-T 10,000 lb. test Christmas tree pictured herewith provided ample safety factor for the completion operations.

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## PERMIAN BASIN

### Southeast Andrews County Wildcat Showing Oil

MIDLAND.—Possibility of a new field for southeast Andrews County was indicated at Stanolind Oil & Gas Co. 1-H Midland Farms, Section 1, Block 42-2n, G&MMB&A Survey, 6 miles northeast of North Cowden pool. This wildcat, located on a large block of acreage recently acquired, was drilled to 4,888 ft., and electrical survey made. A drill-stem test from 4,830-88 ft. open 45 minutes showed 1,830 ft. oil-cut mud, the oil testing 27° gravity, the bottom 65 ft. being drilling mud cut with gas. The prospective pool opener was started as a 6,500-ft. Clear Fork test, and is 9 miles east of the one-well Clabberhill pool, producing from Clear Fork lime.

**Kimble County.**—Phillips Petroleum Co. 1 Spiller, Section 10, Choice Survey, near the Menard County line, continued to hold the interest of operators. Top of Ellenburger was encountered at 2,375 ft., and the hole was carried to 2,405 fet., with casing cemented at 2,373 ft. A drill-stem test at 2,374-92 ft. open 80 minutes had showed gas in 10 minutes and showed 320 ft. gas and oil-cut mud. Another drill-stem test at 2,375-2,402 ft., open 85 minutes, showed gas in 18 minutes, and 220 ft. oil and gas-cut mud.

**Yoakum County.**—Honolulu Oil Corp. 1 Williams, Section 78, Block D, J. H. Gibson Survey, 5 miles south of Dean pool and a like distance southwest of Slaughter pool, had cemented casing to test after a show of oil was logged in drilling to total depth of 5,193 ft. In topping San Andres lime at 4,420 ft., elevation 3,382 ft., this well showed a normal datum compared to dry holes to south and north, indicating very little structural relief.

**Ward County.**—East extension to the South Shipley pool seemed likely at Brown-Hancock and Hines 1 Bray, Section 29, Block 4, H&TC Ry. Survey, which drilled into sandy lime showing oil at 2,532 ft., and in drilling 4 ft. the tools were kicked up the hole several times. The sand is thought to be lower Grayburg, producing in the Shipley pool which opened production in southern Ward County in 1927. Another Ellenburger wildcat is to be drilled in northeast Ward, midway between the Monahans pool and Gulf Oil Corp. 1-B Edwards drilling test. The new test is Gulf Oil 1 John Edwards et al, Section 1, Blk. B-19, Public School Lands.

**Winkler County.**—Failure in the Ellenburger was recorded at Magnolia Petroleum Co. 234 Walton, Kermit-Ellenburger northwest outpost, which swabbed salt water through perforations at 10,698-718 ft. in 5½-in. casing set on bottom at 10,896 ft., after treating with acid. Perforations will be made at 8,920-40 ft., opposite Silurian formation. Sun Oil 2 Keystone, north outpost to the Keystone-Ellenburger pool, showed strong possibilities of opening production from Holt zone of Clear Fork lime by showing good saturation and porosity from 4,963-5,000 ft. A drill-stem test of this horizon showed 120 ft. gas-cut drilling mud and 30 ft. salt water.

**Howard County.**—Completion from a new and deeper pay was recorded for the Vincent pool at Coffield & Guthrie 1 Roy Guffee, east offset to the discovery of the pool. This well was completed for 117 bbl. oil per day from 4,244-4,310 ft. The discovery made 157 bbl. from 4,032-43 ft. last May, and south and southeast offsets were dry after drilling beyond the depth of the two producers.

**Hockley County.**—Official potential of 61.35 bbl. of 27° gravity plus 19.38 bbl. water was recorded for Stanolind Oil & Gas Co. 1 Tom Cobb, Lot 103-E, League 75, Haskell County School Land, opening the Yellow House pool from San Andres lime formation. Total depth of the discovery is 4,685 ft., plugged back to 4,663 ft.

**Crane County.**—Gulf Oil 43-E Waddell, Ellenburger discovery for northeast Sand Hills pool, total depth 5,881 ft., showed an initial potential of 1,275.12 bbl. 35.6° gravity oil, and 55-E Waddell has been started as a northwest offset. Both wells are in Section 21, Block B-26, Public School Land, The Texas Co. 1 Hobbs reached contract depth 6,000 ft., and was plugged back to make production test of Devonian formation topped at 5,260 ft. Seven-inch casing has been cemented at 5,752 ft. No Ellenburger was reached in drilling to contract depth.

**Coke County.**—Tests of Warren Petroleum Corp. 1 Fowler, Ellenburger prospect in Blackwell pool, were disappointing. After treating the Ellenburger pay with 2,000 gal. acid, the well showed 2,500 ft. sulfur water with about 5 per cent oil. Bottomed at 6,425 ft., top of Ellenburger 6,393 ft., 5½-in. casing was cemented at 6,390 ft. Operators plan to plug back in an attempt to shut off the water.

**WEST TEXAS WILDCAT COMPLETIONS**

Dawson County: Gulf Oil 1 Carris S. Dean, NE NW Sec. 30, Blk. 1, J. Poitevent Sur., 11 mi. NE Lamesa, anhydrite 1,710 ft., San Andres 3,760 ft., SO 4,950-5,000 ft., 5,930 ft., dry at TD 10,455 ft.

National Ref. 1 E. W. Cope, 660 ft. from N and W, Sec. 20, Blk. 36-4n, T&P Ry. Sur., dry at TD 5,500 ft.

Gaines County: Honolulu Oil Corp. 1 E. B. Homan, 660 ft. from S and E, Sec. 96, Blk. G, W. T. Ry. Sur., anhydrite 2,238 ft., Yates 3,320 ft., brown lime 4,390 ft., San Andres 5,030 ft., 5,513,000 cu. ft. gas, PB to 3,512 ft. from TD 5,457 ft. Gas discovery, 6 mi. NE Seminole.

Hockley County: Stanolind Oil & Gas 1 Tom Cobb, 660 ft. from S and E Lot

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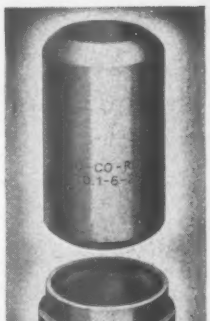

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ROBINSON · ILLINOIS

103-E, Lge. 75, Haskell County School Land, pump 61 bbl. oil, 19 bbl. water, San Andres lime pay 4,596 ft., acid 5,300 gal., TD 4,685 ft. Discovery Yellow House pool.

Howard County: Coffield & Guthrie 1 Roy Guffee, 660 ft. from S and W, Sec. 58, Blk. 20, Lavaca Navig. Co. Sur., pumped 117 bbl., lime pay 4,244 ft., TD 4,310 ft., new pay, Vincent pool.

Menard County: C. H. Murdick 1 George S. Allison, 660 ft. from N, 1,980 ft. from E, Sec. 3, Blk. A, AB&M Sur., dry at TD 3,815 ft., Hickory sand 3,800 ft.

### SOUTHEAST NEW MEXICO

HOBBS, N. M.—Possibility of production from the Silurian formation was seen at Humble Oil & Refining Co. 1 Federal-Leonard, 12-26s-27e, 7½ miles north of Keystone-Ellenburger field in Winkler County, Texas. Six feet of core showing oil and gas was recovered from core at 9,910-25 ft., and it is reported that the well has had 50 ft. of oil-bearing section in drilling to total depth of 9,928 ft.

A new pay was found in Robert McKee and C. M. Bassett 1 Spencer-State, NW NW 3-19s-29e, ¾ mile northwest of discovery of the Turkey Track pool, Eddy County. The new well drilled to total depth of 3,157 ft. and was plugged back to 2,168 ft., where pay from 2,135-2,215 ft. was shot with a total of 240 qt., resulting in a daily potential of 15 bbl. The discovery well had its pay from 2,575-2,690 ft., plugged-back depth from total depth of 3,600 ft.

Three miles west of South Lovington pool, Lea County, Fred Turner, Jr. has staked location for a wildcat to be known as 1-B State, SE SW 4-17s-36e.

### SOUTHEAST NEW MEXICO WILDCAT COMPLETIONS

Eddy County: Robert E. McKee and C. M. Bassett 1 Spencer-State, NW NW 3-19s-29e, elev. 3,424 ft., pump 15 bbl., pay 2,052 ft., shot 140 qt. 2,055-90 ft.; 100 qt. 2,190-2,215 ft., white lime 2,910 ft.; PB to 2,168 ft. from TD 3,152 ft. Discovery, new pay 1 mi. NW Turkey Track pool.

## MICHIGAN

### All Five Completions Dry And State Production Off

SAGINAW.—Five completions were reported for the week, and none was a producer. Four were wildcat tests. Operators took out 10 new drilling permits for tests in eight counties—two in Clare, two in Mecosta, one each in Osceola, Ottawa, Midland, Calhoun, Van Buren, and Lake.

Production for the state shows a declining trend. Estimates of Oil and Gas Association of Michigan give the daily average for March as 51,205 bbl. for a total of 1,587,355, compared with 52,412 bbl. a day and 1,519,485 in February. The decline was centered in four of the principal fields. Goodwell, of Newaygo County, declined about 500 bbl. a day to 1,730. Production dropped about 200 bbl. a day in the Fork-Mecosta, Reed City and Evart fields.

### MICHIGAN WILDCAT COMPLETIONS

Allegan County: Southwest Development 1 Jacob W. Gorton, NE SE NW 13-2n-12w, dry in Traverse limestone, TD 1,708 ft.

Huron County: Sinclair Wyoming Oil Co. Theodore Rink, NE SW NW 24-17n-14e, dry, TD 3,378 ft.

Newaygo County: Sun Oil Co. 1 Consumers Power Co., C N½ NE NW 14-13n-11w, dry, TD 1,069 ft.

Wexford County: Midwest Refineries, Inc. 1 William L. Kellogg, C N½ NW NW 34-21n-11w, dry in Monroe formation, TD 3,790 ft.


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## CALIFORNIA

### Gas Field Rewards Long Hunt in Bay Region

LOS ANGELES.—After an exploratory program extending over several years, during which six unsuccessful wildcats were drilled, Standard Oil Co. of California was rewarded last week with a new gas field in the Suisun district, at the extreme eastern end of Suisun Bay in the San Francisco Bay region. The discovery, 1-A Honker Community, in 25-3n-1w, was good for only 3,200,000 cu. ft. of gas daily from 7,246 ft. indicating the probable existence of a small accumulation. Previously, however, Standard got a much higher flow in a wildcat that was lost because of mechanical trouble and for this reason the 1-A Honker probably does not reflect the real potentiality of the gas zone. Additional drilling on the 50,000 acres under lease may prove up more than one gas field. Standard is vitally interested in natural-gas production through ownership of gas-distributing facilities and because of its use of gas at its Richmond refinery.

Continental Oil Co. 31 Grubb, which opened up a new productive interval in the San Miguelito field last week, flowing 1,558 bbl. of clean 30.6-gravity oil daily from 7,706 ft., is located immediately below the original Grubb zone. It is probably the same zone, although there is a small break between the two intervals which technically might be considered two zones. Continental carried this well down to 8,259 ft. and then plugged back to 7,706 ft. This field is west of the Ventura Avenue field, on the major Ventura anticline and may show characteristics similar to Ventura Avenue, where great thicknesses of oil sand have been found.

The Buena Vista Hills engineering committee held a special meeting at Taft to consider the problem of well spacing for the recently discovered lower zone, which has been fixed as basal Pliocene. Standard recommended development of the new zone on a 20-acre spacing program with wells so located that eventually a 10-acre spacing pattern could be followed. This proposal was approved and the committee recommended approval by the operators committee. Standard also received approval of plans for the drilling of wells to be designated as Nos. 2-G-7, 3-G-8 and 1-G-6 in the SW 33-31s-23e, which will be drilled to the new zone immediately. The original plan for Buena Vista Hills contemplated wider spacing of wells, but was adopted when it was believed a deep prolific zone would be discovered. The present development plan permits increasing well density because of the shallow depth to the pay and also in order to step up production as a war measure. The casing program is relatively simple, although the engineers recommended that both sands should not be exposed in the same well because of their different reservoir characteristics. With the well spacing program approved, operators will now be able to proceed as fast as they wish.

Union Oil Co.'s deep test in the Montebello extension was drilling at 8,500 ft., but still has some distance to go before reaching its goal. Union found some oil sand in a deep test drilled several years ago on a well rather well down on the flank of the structure. The present test is better located and the oil sand that could not be produced in the original test may be productive on top of the structure. If this sand is productive, extensive drilling is anticipated due to the existence of town lots. Many wells in this area have been finished with large enough casing to permit deepening operations and very few new wells will be started.

**CALIFORNIA WILDCAT COMPLETIONS**

Davis wildcat district, Yolo County: Superior 1 Oeste, 10-8n-1e, abandoned in gray shale, TD 5,354 ft., form. test 3,825-47 ft., recovered 140 ft. gas-cut mud, no oil, Hooper sand 3,827 ft.

Eureka wildcat district, Humboldt County: British American 1 Mitchell-Dorr, 16-3n-1w, abandoned in sandstone, TD 2,843 ft., minor show of gas.

Kern Front wildcat district, Kern County: Independent Exploration Co. 1 Austin, 28-28s-27e, abandoned in gray sand, TD 3,002 ft., tested wet on production test 2,634-40 ft.

Kern River wildcat district, Kern County: J. T. Wilcox 1 Zanetti, 17-28s-28e, abandoned in gray sand, TD 3,843 ft., Pyramid Hills sand 3,802 ft., Vedder zone of Miocene age 3,809 ft., barren.

Raisin City wildcat district, Fresno County: Superior 34-10-F, 10-15s-17e, abandoned at TD 6,411 ft., Kreyenhagen 5,959-6,143 ft., Surfluh zone Eocene age 6,208 ft., White sand 6,363 ft., Nortonville sand 6,310 ft., Miocene sand wet, Eocene sand barren.

Suisun wildcat district, Solano County: Standard 1-A Honker Comm., 25-3n-1w, flowed 3,200,000 cu. ft. gas, no oil, flowing pressure 2,229/2,225 lb., shut-in pressure 2,671/2,701 lb., TD 8,304 ft., PB 7,246 ft., opens up new gas field.

## KANSAS

### Simpson Strike in Pratt County Confirmed

LION OIL 1 Andrews, SE SE SE 24-29-14w, in southwestern Pratt County, confirmed reports of 2 weeks ago that a drill-stem test had showed oil in the Simpson, by flowing 60 bbl. per hour of 37.5-gravity oil from perforations at 4,394-4,403 ft. in that formation. After making drill-stem test in the Simpson, the well had been carried to the Arbuckle, which was found dry, 4,471-4,518 ft., then plugged back to test the Simpson.

Continental Oil announced a drilling program of 20 to 25 wells this year on a 12,000-acre block in Sheridan County, on which its 1 Cramer, NW NW NE 11-6-27w opened a new Lansing lime pool last week. Company officials stated they believed they might have a major field, and to meet their mounting crude requirements from Kansas due to the war demands, will attempt to determine the full potentialities of the field as quickly as possible. (Continental's announcement will undoubtedly stimulate further wildcatting in this area.)

Heavy rains, snow and floods handicapped field work in Kansas this past week and several promising wildcats have been delayed in testing.

**KANSAS WILDCAT COMPLETIONS**

Barber County: Alpine Oil 1 Curry, SE 5-31-12w, dry, TD 4,834 ft., Arbuckle 4,804 ft.

J. M. Huber 1 Skinner, W½ NW NW 17-31-14w, 35,000,000 cu. ft. gas at 1,467 lb. RP from cherty dolomite at 4,356-74 ft., after acidizing; original TD 4,627 ft., Viola 4,397 ft., Arbuckle 4,609 ft., PB to 4,401 ft.

Dickinson County: Phil-Han 1 Utech estate, SE 3-16-4e, dry, TD 2,300 ft., chat at 2,247 ft.

Ellis County: Bradley & Dozier 1 Engel, SW NW 3-14-19w, dry, TD 3,905 ft., Arbuckle 3,874 ft.

Russell County: The Texas Co. 1 Beisel, NE NE SE 6-14-11w, dry, TD 3,306 ft., Arbuckle 3,290 ft.

J. M. Huber 1 Truan, SW SW NE 17-15-15w, dry, TD 3,388 ft., Arbuckle 3,356 ft.

Stafford County: Atlantic Refining 1 McCandless, SW SE 30-25-13w, physical potential 734 bbl. oil per day from Simpson at 4,251-67 ft.; original TD 4,323 ft., Arbuckle 4,289 ft., PB to 4,277 ft.


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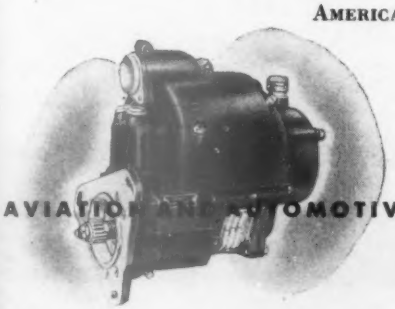

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# March Completions Increase 15 Per Cent

| | Comp | Oil | Prod. | Gas | Dry | Under 1,000 ft. | 1,000-2,500 ft. | 2,500-5,000 ft. | 5,000-10,000 ft. | Over 10,000 ft. | Total footage | Rigs and drilling |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N. Y., Penna., W. Va. | 301 | 200 | 290 | 89 | 12 | 7 | 241 | 51 | 2 | 0 | 576,192 | 480 |
| Ohio | 73 | 9 | 409 | 35 | 29 | 8 | 20 | 45 | 0 | 0 | 204,475 | 172 |
| Indiana | 22 | 13 | 1,196 | 1 | 8 | 2 | 14 | 6 | 0 | 0 | 44,022 | 40 |
| Kentucky | 77 | 30 | 4,215 | 23 | 24 | 11 | 51 | 15 | 0 | 0 | 155,713 | 182 |
| Michigan | 32 | 14 | 5,315 | 0 | 18 | 0 | 16 | 16 | 0 | 0 | 75,703 | 92 |
| Illinois | 150 | 93 | 9,860 | 0 | 57 | 11 | 55 | 84 | 0 | 0 | 367,947 | 164 |
| Kansas | 177 | 86 | 27,616 | 7 | 84 | 1 | 7 | 166 | 3 | 0 | 607,823 | 268 |
| Nebraska | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Missouri-Iowa | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 480 | 3 |
| Oklahoma | 140 | 68 | 14,927 | 10 | 62 | 7 | 33 | 75 | 25 | 0 | 494,442 | 354 |
| Texas: | | | | | | | | | | | | |
| North Texas | 90 | 68 | 29,504 | 0 | 22 | 12 | 38 | 23 | 17 | 0 | 254,215 | 68 |
| West Central Texas* | 33 | 23 | 11,332 | 0 | 10 | 6 | 6 | 12 | 1 | 0 | 63,640 | 21 |
| West Texas* | 126 | 109 | 75,638 | 0 | 17 | 1 | 10 | 66 | 44 | 2 | 563,429 | 222 |
| Texas Panhandle | 14 | 10 | 1,199 | 0 | 4 | 0 | 1 | 13 | 0 | 0 | 41,688 | 69 |
| East Texas | 33 | 12 | 2,718 | 1 | 20 | 0 | 0 | 6 | 26 | 1 | 195,200 | 23 |
| Upper Gulf Coast | 40 | 22 | 5,870 | 0 | 18 | 1 | 0 | 3 | 34 | 2 | 278,203 | 103 |
| Lower Gulf Coast | 59 | 36 | 6,070 | 5 | 18 | 0 | 0 | 9 | 50 | 0 | 344,708 | 88 |
| South Central Texas | 10 | 2 | 238 | 0 | 8 | 1 | 4 | 3 | 2 | 0 | 31,063 | 11 |
| South Texas | 39 | 10 | 1,335 | 3 | 26 | 0 | 2 | 16 | 21 | 0 | 198,424 | 53 |
| Total Texas* | 444 | 292 | 133,904 | 9 | 143 | 21 | 61 | 151 | 195 | 5 | 1,970,570 | 658 |
| Southeast New Mexico | 42 | 30 | 5,807 | 1 | 11 | 3 | 7 | 31 | 1 | 0 | 127,131 | 29 |
| Northwest New Mexico | 1 | 1 | 140 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 727 | 14 |
| Arkansas | 20 | 11 | 1,410 | 0 | 9 | 0 | 0 | 6 | 14 | 0 | 127,814 | 28 |
| North Louisiana | 24 | 8 | 1,118 | 1 | 15 | 1 | 3 | 11 | 8 | 1 | 117,503 | 30 |
| Louisiana Gulf Coast | 41 | 30 | 5,420 | 1 | 10 | 0 | 0 | 2 | 19 | 20 | 368,901 | 109 |
| Mississippi and Southeast | 11 | 5 | 575 | 0 | 6 | 0 | 2 | 4 | 4 | 1 | 51,421 | 22 |
| Montana | 18 | 16 | 1,481 | 0 | 2 | 0 | 7 | 11 | 0 | 0 | 46,629 | 99 |
| Wyoming | 16 | 14 | 8,958 | 0 | 2 | 0 | 2 | 13 | 1 | 0 | 74,110 | 91 |
| Colorado-Utah | 1 | 1 | 1,400 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 6,794 | 27 |
| California | 155 | 135 | 23,517 | 2 | 18 | 10 | 43 | 72 | 24 | 6 | 574,062 | 217 |
| Oregon | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 6,940 | 0 |
| Arizona | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 3,607 | 0 |
| Total March* | 1,748 | 1,057 | 247,561 | 179 | 512 | 84 | 562 | 760 | 298 | 33 | 6,002,376 | 3,082 |
| Total February† | 1,520 | 912 | 247,355 | 161 | 447 | 73 | 514 | 652 | 253 | 28 | 5,009,918 | 3,243 |

*Includes old wells drilled deeper. †Revised.


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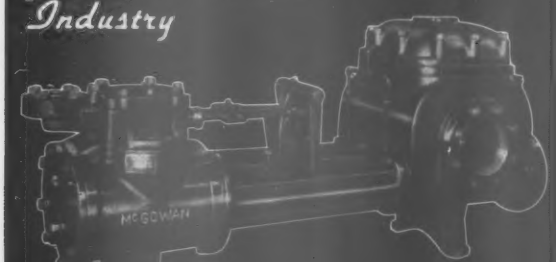

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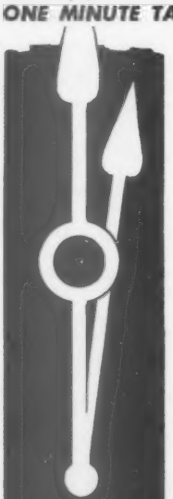

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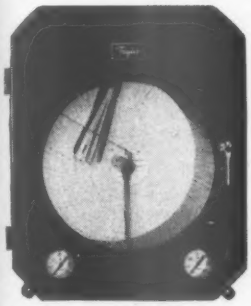

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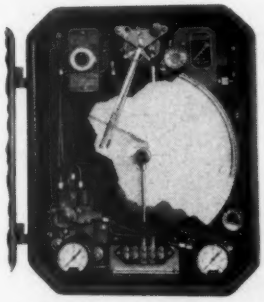

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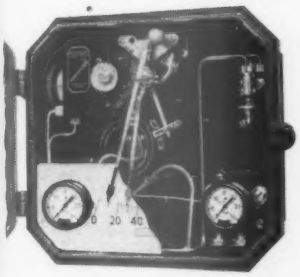

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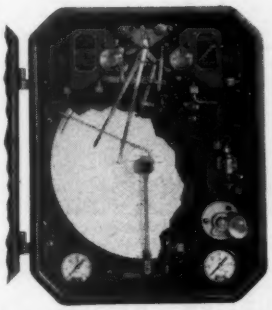

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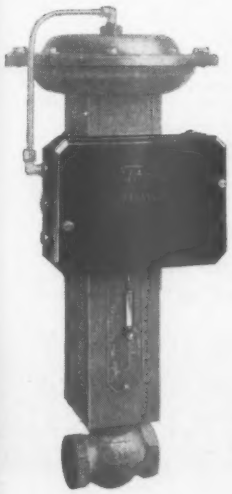
A single duty Fulscope Controller (recording or indicating) in which *linear* control point adjustments, *indicated by a set pointer,* are pneumatically made by output pressure changes of a primary instrument controlling or transmitting a related variable.



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## OKLAHOMA

### West Edmond Gets 1½-Mile Extension to North

THE West Edmond pool was extended 1½ miles north by Sohio Petroleum Co. 1 Williams-A, SE SW 7-14n-4w, which was preparing to run casing after finding oil in the Bois d'Arc section of the Hunton. Mississippi lime top was 6,820 ft., Woodford 6,865 ft., and the Bois d'Arc pay at 6,915-72 ft. This well was drilled as a "tight hole" and the release of the log data will add to the discussion among geologists as to West Edmond's future possibilities. Some had thought there was a good chance the Sohio well would find the Bois d'Arc missing and instead get good Wilcox production.

Reports of salt-water encroachment in wells in the SE SW 31-14n-4w, the SE NE 36-14n-5w, the NE NW 6-13n-4w and the NW NE 6-13n-4w indicate that the southwest edge of the field may be defined, and state Corporation Commission hearings will be held to consider reduction of well allowables below the present 300 bbl. per day.

Although most of the interest in West Edmond was swinging toward the northeast part of 14n-4w, wells in 9, 17 and 19-13n-4w to the south of present production will be watched carefully.

Twenty-five miles south and slightly east of West Edmond, the West Moore pool had its third producer, as Mid-Continent Petroleum Corp. 1 Tubbs, SW SE 29-10n-3w, east offset to the discovery well, flowed 851 bbl. in 24 hours through a 26/64-in. choke from the Wilcox. Data on formation depths on this well have not yet been released.

About 15 miles south of West Moore, Carter Oil Co. 1 Cottingham, SE SW 4-7n-3w, recent Wilcox discovery, which had attempted to shut off water with a cement squeeze job, was reperforated and flowed 536 bbl. of oil and 35 bbl. of water in 35 hours through a ½-in. tubing choke. Another squeeze job will be attempted. The same company's 1 Johnson, SW NE 13-8n-4w, failed to find production in the Pennsylvania, after being dry in both Wilcox and Hunton. Tubing is being pulled and the rig will probably be moved to drill Lamar 1, NE SW 28-8n-3w, a location 2¼ miles north of the Cottingham.

The entire area from West Edmond to the Cottingham is getting a strong play, and only the shortage of heavy drilling equipment will keep testing slowed down.

**OKLAHOMA WILLDCAT COMPLETIONS**

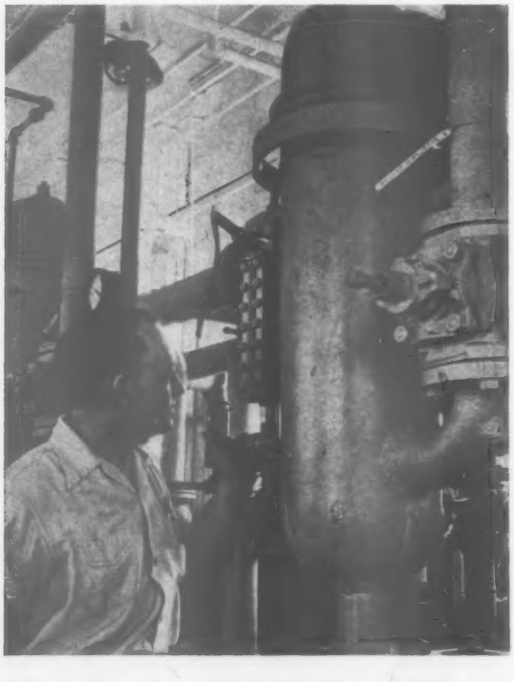
Hughes County: Ace Gutowsky 1 Godfrey, NW NW 26-8n-8e, dry, TD 4,332 ft., Wilcox 4,310 ft.

Okfuskee County: Sunray Oil 1 Gee, SE NE SW 1-12n-8e, dry, TD 3,540 ft., Dutcher 3,441 ft., Pitkin lime 3,494 ft.

Summit Drilling et al 1 Gafford, SE SE NW 12-11n-7e, dry, TD 3,735 ft., Cromwell 3,686 ft.

Seminole County: Mealy-Wolf 1 Baker, SW SE NE 35-9n-7e, dry, TD 3,585 ft., Cromwell 3,525-77 ft.

Sephens County: Sohio Production 1 Franklin, NE SW 20-1n-8w, dry, TD 5,003 ft., Canyon lime 5,065 ft., granite wash 4,620 ft.

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## OHIO, KENTUCKY

### Muskingum County Gets Gas Extension

ZANESVILLE.—A west side gas extension of a small oil pool on the Fisher tract in Section 14, Wayne Township, Muskingum County, was found by Preston Oil Co. The well gaged 2,630,000 cu. ft., and made 10 bbl. of oil through separator, from pay zone of 3,804-64 ft., in total sand thickness of 3,799-3,864 ft.

Preston 2 Theo. Combs in Section 10, Madison Township, Perry County, also a west offset to an oil well, drilled 12 ft. into the Clinton and gaged 1,380,000 cu. ft.

William Pfeiffer completed an extension to the Sandyville field on the Corundite Refractories tract, Lot 76, Lawrence Township, Tuscarawas County. A small pay in the Red Clinton at 4,573-4,612 ft., and 575,000 cu. ft. in the White Clinton at 4,612-44 ft. was shot and it gaged 1,069,000 cu. ft., with 1,340 lb. rock pressure.

The Ohio Oil Co. deep test on the Chaney tract in Lot 20, Clark Township, Coshocton County, was abandoned at 927 ft. in the Trenton lime at 5,660 ft., after losing a string of tools.

**OHIO WILDCATS**

Coshocton County, Clark Township: Ohio Oil 2 C. R. Chaney, Lot 20, Trenton, 4,733-5,660 ft., still in limestone; dry, TD 5,660 ft.

**EASTERN KENTUCKY**

ASHLAND.—One oil well, 24 gas wells and 9 dry holes have been completed in the eastern Kentucky fields in the past week. The oil well was a 25-bbl. producer while the combined open flow of the gas wells was 11,976,000 cu. ft. daily.

Diedrich & Ware completed 1 Blain Clark land on Wolf Creek in Martin County at a total depth of 1,387 ft. in Maxon with a daily production of 25 bbl. of oil.

Columbian Fuel hit an outstanding gas well in 3 Smith heirs tract G.W. 846. This

was an old well, drilled deeper, and has a daily open flow of 4,700,000 cu. ft. of gas in Maxon.

**Clinton County.**—Interest is running high in the Kentucky-Tennessee border area as a result of the Vawter discovery in Clinton County. Early this year, Irvine J. Vawter 1 Dickens Brothers, a wildcat test headed for the Granville lime, was drilling at 190 ft., with a hole full of water and no casing, when it suddenly started flowing oil from the Corder limestone. After being brought under control, the well pumped about 350 bbl. of oil with considerable gas. Later, when tubing was pulled and water bailed out, the well flowed 20 bbl. of oil in 70 minutes. Eleven new locations have been made in all directions from the discovery well, ranging from ¼ mile to 3 miles away.

The discovery seems to be a new pool on the Desda anticline, from which structure other shallow pools have been producing steadily increasing quantities of oil since 1939. The 1943 production from fields along the anticline is estimated at 19,500 bbl., compared to only 11,000 bbl. in 1942. A total of about 55 shallow oil wells are producing along this structure, 16 of which were completed in 1943 and 10 to date in 1944. Wells range in depth from about 300 ft. along the creek bottoms to 700 ft. in locations on top of the hills.

### WESTERN KENTUCKY

OWENSBORO, Ky.—Eight wells completed in Western Kentucky in the past week included two oil wells with a combined initial of 115 bbl. and Carter Oil Co.'s deep test in Ohio County, 1 J. T. Wilson, 3 miles northwest of Rochester, which was abandoned at 3,937 ft. It had Devonian lime top at 3,405 ft. and Silurian top at 3,830 ft.

Calstar Petroleum Co. 1 Dyer-Higginson, 8 miles west of Morganfield, Union County, was acidized in McClosky lime at 2,816-19 ft. and flowed 77 bbl., 85 bbl. and 105 bbl. in successive hours. It was shut in for tankage, but when reopened would not flow.

## WILDCAT COMPLETIONS AND DISCOVERIES

| | Week ended Apr. 22, 1944 | | | | | Cumulative total 1944 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Oil | Dist. | Gas | Dry | Tot. | Oil | Dist. | Gas | Dry | Tot. |
| Ohio | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 7 | 18 | 25 |
| Indiana | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 4 | 6 |
| Kentucky | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 16 | 20 |
| Illinois | 1 | 0 | 0 | 5 | 6 | 7 | 0 | 0 | 79 | 86 |
| Michigan | 0 | 0 | 0 | 4 | 4 | 4 | 0 | 0 | 64 | 68 |
| Kansas | 1 | 0 | 1 | 5 | 7 | 18 | 0 | 3 | 122 | 143 |
| Nebraska-Missouri-Iowa | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 6 | 7 |
| Oklahoma | 0 | 0 | 0 | 5 | 5 | 14 | 0 | 6 | 67 | 87 |
| TEXAS: | | | | | | | | | | |
| North Central | 3 | 0 | 0 | 6 | 9 | 16 | 0 | 0 | 80 | 96 |
| West | 2 | 0 | 1 | 3 | 6 | 10 | 0 | 1 | 45 | 56 |
| Panhandle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| East | 0 | 0 | 0 | 4 | 4 | 2 | 0 | 0 | 40 | 42 |
| Gulf Coast | 0 | 0 | 0 | 3 | 3 | 15 | 4 | 3 | 60 | 82 |
| Southwest | 0 | 0 | 0 | 3 | 3 | 12 | 3 | 7 | 71 | 93 |
| TOTAL | 5 | 0 | 1 | 19 | 25 | 55 | 7 | 11 | 298 | 371 |
| LOUISIANA: | | | | | | | | | | |
| North | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 18 | 20 |
| Gulf Coast | 0 | 0 | 0 | 1 | 1 | 2 | 4 | 0 | 19 | 25 |
| TOTAL | 0 | 0 | 0 | 1 | 1 | 4 | 4 | 0 | 37 | 45 |
| Arkansas | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 16 | 18 |
| Mississippi and Southeast | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 25 | 29 |
| Montana | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 1 | 3 | 5 |
| Wyoming | 1 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 6 | 12 |
| Colorado, Utah | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 5 |
| New Mexico | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 19 | 20 |
| California | 0 | 0 | 1 | 5 | 6 | 3 | 0 | 5 | 43 | 51 |
| TOTAL UNITED STATES | 9 | 0 | 4 | 46 | 59 | 127 | 11 | 33 | 827 | 998 |
| Total previous week | 9 | 0 | 1 | 48 | 58 | | | | | |

### LEGAL

Notice of Oil and Gas Lease sale: The U.S. Department of Agriculture will award leases on 15 tracts of approximately 2,480 acres each in Cochran County, Texas, on former Slaughter Ranch. Rent $1.00 per acre. Awards limited to 1 tract per lessee. Sealed bids to be publicly opened May 1. Bid forms and additional information can be secured from Ray E. Davis, Acting Regional Director, Farm Security Administration, Old Post Office Building, Amarillo, Texas.

### LEGAL

U. S. DEPARTMENT OF THE INTERIOR General Land Office, Washington, D. C. Notice is hereby given that the N½ NW¼ Sec. 14, T. 26 N., R. 90 W., 6th P.M., 6[illegible] acres, Lost Soldier oil and gas field, Wyoming, is offered to the responsible qualified bidder of the highest cash bonus per acre for lease under section 17 of the mineral leasing act, as amended by the act of August 21, 1935 (49 Stat. 674, 30 U. S. C. 226). The minimum acceptable bonus is $2,000 per acre. Sealed bids will be received in the office of the Secretary of the Interior, Interior Building, Washington 25, D. C., up to 12 noon May 1, 1944. Each bidder must submit a certified check or cash for one-fifth of the amount bid, payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus and the annual rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be furnished by the successful bidder prior to the issuance of the lease. The deposits of the other bidders will be returned. The envelopes should be plainly marked "Bid for lease in Lost Soldier field. Not to be opened before noon May 1, 1944." No bid received after the time fixed herein for submitting bids will be considered. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Fred W. Johnson, Commissioner.

## LA.-ARK.

### East Extension Well in Atlanta Makes Good Flow

MAGNOLIA, Ark.—Durbin Bond 1 J. L. Hendricks, east extension well to Atlanta field in SW NE 13-18-19, on test flowed 240 bbl. of 45.4-gravity oil in 24 hours through a ⅛-in. choke, with a gas-oil ratio of 900 cu. ft. Total depth was 8,182 ft., with pipe set at 8,174 ft.

Tide Water Associated Oil Co. 1 J. S. O'Bier, an Atlanta west end well in SE NE 18-18-19, on test flowed 200 bbl. per day of 44.4-gravity oil through a ½-in. choke, with a gas-oil ratio of 903 cu. ft., from perforations at 8,252-55 ft.

**Ashley County.**—Union Production Co.'s wildcat in southwestern Ashley County, D-2 Crossett Lumber Co. in 3-18-9, was dry at 5,700 ft., and has plugged back to 5,058 ft.

### Gulf Plans Drilling Program In Heidelberg and Eucutta

JACKSON.—Gulf Refining Co. plans an intensive drilling campaign in the Heidelberg field of Jasper County and the adjacent Eucutta field of Wayne County. Between 50 and 55 wells will be drilled in the Heidelberg field, where Gulf recently completed its second well, 1 Morrison, NW NE SE 30-1n-13w, as the largest well ever found in the state. Approximately 25 wells will be drilled in the Eucutta field, which lies about 15 miles southeast of the Heidelberg area.

Adoption of a surface casing regulation for the Heidelberg field is expected after a hearing before the Mississippi Oil and Gas Commission on May 4. Proposed regulations were discussed at a preliminary meeting in Jackson on April 30 and these are being distributed to operators for study before the May 4 hearing.

### LEGAL

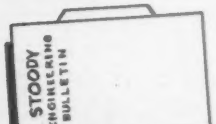
U. S. DEPARTMENT OF THE INTERIOR. General Land Office, District Land Office. Las Cruces, New Mexico. Notice is hereby given that the lands herein described within the known geologic structures of the Pecos Valley and Red Lake oil and gas fields, New Mexico, are offered to qualified bidders of the highest cash amounts offered per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act, as amended by the act of August 21, 1935 (49 Stat. 675, 30 U.S.C. 226), at a sale to be held in the District Land Office at Las Cruces, New Mexico, at 10 a.m., on May 18, 1944, in the following parcels, all in T. 17 S., R. 28 E.: Pecos Valley Field, Parcel No. 1, lots 1, 2, 3, 4, S½ N½, E½ SE¼ Sec. 3, E½NE¼ Sec. 10. Parcel No. 2, W½W½ Sec. 5 Red Lake Field. Parcel No. 3, SW¼SW¼ Sec. 10. Parcel No. 4, NE¼ Sec. 15. Each successful bidder must deposit on the date of sale with the officer in charge of the sale a certified check or cash for one-fifth of the amount bid by him, and file the showing of qualifications to receive a lease, required by section 7 of Circular 1386. The remainder of the bonus bid and the annual rental at the rate of one dollar per acre must be paid and a $5,000 corporate surety bond must be furnished prior to the issuance of the lease. Each parcel will be offered for sale separately, but the successful bidder of the two parcels in either field may consolidate the two parcels in a single lease and may file a collective bond. Bids may be submitted by mail provided they are accompanied by one-fifth of the bonus bid and a showing of qualifications of the bidder. The envelope should be plainly marked for opening on the day and hour of the sale. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Paul A. Roach, Register.

Doubles tool joint life

For fifteen years Tube Borium has been used on drilling bits to increase cutting speeds and drill more out-to-gauge hole. Now you can use this same alloy to greatly prolong the life of your tool joints!

An exceedingly small quantity of Tube Borium welded in a ring around the shoulder not only doubles tool joint life—even under the toughest operating conditions—but maintains over all joint strength and correct elevator contour. Applications are economically made on both new and resleeved joints.

**APPLICATION: Accepted method of application is to under-cut new or resleeved joints at the shoulder to form a recess ⅛" deep by 1½" wide. The recess is then filled by welding in with ⅜" Electric Tube Borium to form the wear resistant inlay.**




Write for this special Stoody engineering bulletin describing in detail hard-facing procedures on tool joints,—no obligation.

**STOODY COMPANY**
**1138 WEST SLAUSON, WHITTIER, CALIF.**

STOODY HARD-FACING ALLOYS
*Retard wear... Save Repair*


## Among the

# Drilling Contractors

**Oil Ventures, Ltd.,** of Calgary, which has for some years provided oil-field service for Turner Valley, is opening a branch in the Taber field, southern Alberta, with a resident engineer in charge.

**Taggart Brothers Co.** is the drilling contractor on the C. L. Maguire, Inc., 1 M. H. Oliver, in S½ SE NE 11-14n-7w, Mecosta County, Michigan.

**Regent Drilling Co.** has finished Franco-Hoppe 1 in the Vermilion field, eastern Alberta, for Franco Oils, and has contract for Franco-Riley 1 for the same company, to be drilled at once.

**Newell & Chandler,** of Calgary, have spudded Universal Petroleum 1, LSD 15, 25-8-17w4, in the Taber field as the first of a three-well program for the Universal company.

**Hess Drilling Co.** is the drilling contractor on the R. A. Lane 1 S. L. DeBoard, in NE NE SW 32-5s-8e, White County, Illinois, about 4 miles northwest of Norris City. The test was drilling below surface casing.

Charles H. Lebow and George A. McNee, copartners in the drilling contracting firm of **Lebow & McNee,** have made an agreement with A. M. Donnelly, who will act as limited agent of the firm during the drilling of several wells for Standard in the Rio Vista gas field and at Tracy.

**Gordon Oil Co.** and Jim Collins have been awarded drilling contract on the C. W. Collins 1 Michael Bowmann, in NE SW SW 29-14n-7w, Mecosta County, Michigan.

**Bender Drilling Co.** has spudded in a new well for Royalty Service Corp. on the Nelson lease in the Wilmington field, California, and will probably complete the hole in the Ranger zone.

**Bell & Loffland,** California drilling contractors, have the contract to drill the Elysian Park well for Seaboard Oil Co. which will be surfaced outside the Elysian Park and bottomed beneath the park by directional drilling. Title to the public park prevents locating the well within the confines of the park but this has been overcome by locating on property outside the limits of the park and whipstocking beneath the park. An early spud will be made and this job will require careful planning to prevent objectionable noises.

**William B. Host** has been awarded drilling contract on Freeman Oil Co. 1 Agnes J. Gleason, in C NE½ NW NE 35-17n-4w, Clare County, Michigan.

**Hislop Construction Co.,** specializing in the erection of derricks, is opening a branch at Taber, Alta., in charge of Alex Hislop.

**L. L. White,** drilling contractor recently spudded in a new well for Ohio Oil Co. in the Coles Levee field

A. P. I. "X-L"
RECESSED
LINE PIPE
COUPLINGS

**Our special patented process of recessing "X-L" Couplings assures perfect alignment, tighter joints and protection of vanishing threads—giving longer life to the line. Made in strict accordance with A.P.I. standards in all sizes. Microscopically tested to insure maximum accuracy.**

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Los Angeles, San Francisco

**WHEELING MACHINE PRODUCTS COMPANY**
WHEELING, WEST VIRGINIA

*Left: J. A. Roberson, toolpusher for Lofland Brothers Co., drilling for California Co. in the Cranfield field, Adams County, Mississippi. Right: One of Lofland's crews in the field. Front, Earl Crawford; rear, left to right, Winford McGehee, Troy Welborn, W. A. Savage, R. W. Williams and C. N. Stockstill (driller). Three rigs are running in the field*

of Kern County, California, to be known as 78-10 S.C.L.U.

**Ab Haynes**, rig-building contractor, Mount Pleasant, Mich., is reported to have a contract to run a large rotary derrick in the northeastern area of Canada, in a development plan being undertaken by the Canadian government.

**Summit Drilling Co.** has the contract to drill the Flynn Oil Co. 1 Kinsley, in NE NW NW 22-14n-4e, Lincoln County, Oklahoma, southeast of Chandler, on a farmout from Deep Rock Oil Corp.

**Muskegon Development Co.** will be the drilling contractor on the Chapman Oil Co. 1 Alice R. Crosby, in C S½ NE SE 15-16n-1w, Midland County, Michigan.

**Union Rotary Corp.** will drill on contract the Sohio Petroleum Co. 1 Oscar Backstrom, in C½ NE NW 36-19n-10w, Osceola County, Michigan.

**Perry-Buske & Ormiston** are the drilling contractors on the Clifford A. Perry 1 Edwin and Alice Boerma, in NE SE NE 35-7n-15w, Ottawa County, Michigan.

**Stuart Godfrey** has been awarded drilling contract on the Harris Oil Co. 1 J. and S. Nathanson, in NW NW SW 25-1s-16w, Van Buren County, Michigan.

**Triangle Drilling Co.** has applied for permit to drill its 1 Frierson Co. et al, in Holly field, De Soto Parish, Louisiana, 330 ft. west and 330 ft. south of the NE cor. SE NE 33-14n-13w.

**Markley - Bankhead, Inc.**, Baton Rouge, La., are drilling contractors for a new wildcat Ohio Oil Co. will drill in the Hope Villa area, East Baton Rouge Parish, Louisiana. The wildcat, the 1 Fred Piker, is to be located in 1-8s-2e, and will be carried to a depth of 9,600 ft.


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Heat and corrosion resisting metals and high strength alloy steels.

Alloy steel studs and bolts for high pressure piping stocked for immediate shipment.

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Here lies the body
Of Jim McQuirk
He hung up his line
And lost his shirt

Brodie would never have used a Baker Rotary CASING Scraper—he would have taken a chance like our friend Jim, bless his soul. Jim figured the inside of the casing was clean—no scale, no burrs from gun-shot holes, no hardened cement. There's a new driller on the rig now and also a Baker Rotary CASING Scraper. This is one of the sweetest, simplest, most business-like tools you ever saw . . . turn to Page 357 of the 1944 Composite (or Baker) Catalog and look it over—or write us for a swell portrait of it.

*(Just in case you might want to use one of 'em look on Page 302.)*

**BAKER**
**ROTARY CASING SCRAPER**
**BAKER OIL TOOLS, INC.**



WORLD'S BEST LEAK PREVENTER IS STILL AVAILABLE TO YOU

Since the start of the war, many users have switched away from old fashioned "thread dopes" and tried RECTORSEAL for the first time. They have found that this modern compound is so far superior to what they had been using that they swear they'll never use anything else.

Ships, tanks, and other direct war uses continue to take a large proportion of our capacity.

Despite these added uses of RECTORSEAL, your cooperation in furnishing us proper priority and end use information has enabled us to maintain adequate stocks, and to make immediate shipments on all oil industry requirements. Whether you need one-half pint or 100 gallons, you can count on our furnishing it promptly for the all important use of drilling and maintaining oil properties.

Protect your properties by using RECTORSEAL on *all* threaded connections—save every drop of oil and every foot of gas! Buy it from your Supply Store.

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**Ft. Worth, Texas**

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THE POSITIVE LEAK PREVENTER

# PERSONALS

## Shell Development Elects Johnson To New Post

A J. JOHNSON, head of the engineering department of Shell Development Co. and recently elected a vice president, has been with the Shell organization since 1929. Shortly after receiving his master's degree from Tulane University in that year he got a job in the Norco, La., refinery of Shell Oil Co., Inc., as a member of the laboratory staff. Later he was made assistant department head. In 1936 he was transferred to St. Louis as senior technologist in the development division of the manufacturing department. Here he specialized in plant design and soon he was advanced to assistant manager of the division.

Next Johnson was moved from St. Louis to Houston, where he assumed the position of assistant superintendent of Shell's refinery there. He filled that post until 1940, when he was assigned to San Francisco as head of the engineering department of Shell Development Co. He is a member of American Chemical Society and of Alpha Chi Sigma fraternity.

**John A. Poulin,** formerly geologist for The Texas Co. in South America, has joined United Geophysical Co., S. A., with headquarters in Caracas, Venezuela.

**Don B. Hibbs,** with Cooperative Refinery Association in western Kansas for the past 4 years, has been assigned to the Wichita office as landman and pipe-line scout. The association recently purchased the producing properties and pipe lines of National Refining Co. and opened an office in Wichita.

**Edward Falck** has been appointed director of Office of War Utilities, succeeding **J. A. Krug,** who is leaving to take a commission as lieutenant commander in the Navy for assignment to active duty. Falck, deputy director of OWU since February 1943, was serving also as executive director of the Combined Production and Resources Board, and he will continue to fill that post.

**James C. Gilbert,** who was superintendent for Barnsdall Oil Co. in Los Angeles, has been made superintendent for Husky Refining Co., Cody, Wyo.

**B. L. Wright,** district chief chart clerk for United Gas Pipe Line Co. in the Beeville, Tex., district, has been transferred to the general office in Shreveport as chart auditor.

**Max W. David,** who received an honorable discharge from the U. S. Navy several months ago, has returned to Midland, Tex., as district geologist for Phillips Petroleum Co. Since his discharge David had been with Phillips in Evansville, Ind. Before joining the Navy he was engaged in consulting work and independent oil operations.

*I. A. McCUTCHIN*

**John A. McCutchin,** for the past 7 years chief engineer for British American Oil Producing Co. in Tulsa, will take full charge of all exploration and exploitation work for British-American Oil Co. in western Canada, with office at Calgary. He will also take over all duties previously handled by **G. E. Watt,** who, on December 31 next, will retire after 30 years' service with the company.

**Marvin Lee,** consulting geologist, Wichita, Kans., has been made head of Cooperative Refinery Association's recently organized geological and exploration division. Four other geologists will help him in development of 104,469 acres in Texas, Kansas, Illinois, and New Mexico in a program designed to provide crude production for cooperative refineries.

**J. R. Carringer,** vice president of Standard Oil Co. of New Jersey, was honored in Elizabeth, N. J., at the semiannual conference of supervisors and foremen of the New Jersey refineries last week on completion of 40 years of service. Carringer started in a tank-car repair shop in 1903. In 1921 he was made general superintendent of the Bayway, N. J., refinery. By 1933 he was assistant general manager of all the company's New Jersey refineries and later became general manager of manufacturing operations. He was elected a director in 1940 and vice president in 1943.

**D. R. Knowlton,** director of production for Petroleum Administration for War, and **Robert V. Shirk,** of the manpower section of the production division, both of Washington, are in the Rocky Mountain area holding conferences with oil men and meetings of the several Petroleum Industry War Council committees for District 4.

**Kenneth A. Ackley** has been named chief scout for The Carter Oil Co., replacing **Wayne W. Breedlove.** Ackley graduated from University of Oklahoma in 1929 with a degree in geological engineering. He joined Carter in 1937, and was employed in subsurface geological work in Oklahoma and Illinois. Ackley recently was transferred to Tulsa from Baton Rouge, La., where he had been crude-oil scout since 1942. Breedlove, who resigned as chief scout to take a position with Mid-Continent Map Co., had been with Carter more than 15 years.

**John R. Coughlin** has been appointed supervisor of all refinery tank-car, tank-truck, and barrel-loading operations at the Bayway, N. J., refinery of Standard Oil Co. of New Jersey. He will continue to serve as supervisor of the industry tank-car unloading rack. Coughlin

also will oversee gasoline blending operations. **James McNesby** has been made day supervisor at the industry rack.

**E. H. Dipple,** tristate engineer at Evansville, Ind., for Continental Supply Co., has joined the Washington staff of **Claude P. Parsons,** director of materials for Petroleum Administrator for War.

**E. Q. Mills,** formerly safety director of The Shamrock Oil & Gas Corp., has been promoted to foreman of the transportation and bulk station department at Sunray, Tex.

**Charles E. Yager,** vice president and chief geologist of Texas Pacific Coal & Oil Co., Fort Worth, was elected executive vice president last week. Yager received his B.S. degree in geology from University of California in 1922. He went to work for Texas Pacific and has been in its service ever since, except for 6 months in 1923, when he was assistant field superintendent for Freeport Sulphur Co. He was made chief geologist for Texas Pacific in 1929.

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CHEMICAL MEASURING
PUMP
Extremely Accurate
DEPENDABLE
Accuracy of delivery in McCord chemical pumps is the result of a finely engineered design with a minimum number of parts. Dependability is insured because working parts are fully enclosed, protected from dirt and the elements. Specify McCord. For sale by National Supply Co.
Standard of the Oil Fields
McCORD
RADIATOR & MFG. CO., DETROIT, MICH.


**J. C. Williamson,** district geologist for Phillips Petroleum Co. in West Texas and New Mexico, will leave that position May 1 to open an office in Midland, Tex., as a consulting geologist. **E. A. McCullough,** of Phillips' scientific staff, will serve as acting district geologist.

**S. B. Ireland** was elected president of Cities Service Gas Co. last week after **H. R. Straight** had resigned as president and director. **A. W. Ambrose** also resigned as vice president and director. It was explained that expanding activities in oil production, refining and marketing demanded all the time of the two men, who will retain their posts as president and executive vice president, respectively, of Cities Service Oil Co. Ireland, who has handled corporate reorganization and financial matters for Cities Service interests at his office in New York, will take over his new position at once.

**Joe Pearson,** for 3 years an operator for Schlumberger Well Surveying Co., has joined the geological staff of Sohio Petroleum Co. in Oklahoma City. For the immediate future he will devote his attention to the West Edmond pool. **L. R. Blodgett,** formerly in St. Louis, was scheduled to arrive at Oklahoma City this week to serve as regional scout for Sohio's land and geological departments. **Don Hyatt** is division geologist.

**David E. Fields,** vice president and sales manager of Tulsa Boiler & Machinery Co. in Tulsa, was named last week an industrial counsellor of University of Oklahoma Research Institute. Fields graduated from University of Oklahoma in 1925 with a B.S. in mechanical engineering and 3 years later received his professional degree. He joined Tulsa Boiler & Machinery Co. upon his graduation, left in 1927 to take a position with Shell Oil Co., Inc., and rejoined his previous employer 2 years later. Fields is treasurer of Oklahoma Society of Professional Engineers and of Engineers Club of Tulsa. He is a member of Technical Club of Oklahoma, National Society of Professional Engineers, and American Society of Mechanical Engineers.

**Charles E. Chapell,** formerly senior clerk in the land department of Stanolind Oil & Gas Co., Tulsa, has joined Sinclair Prairie Oil Co. as scout in the Shawnee, Okla., area. He takes the place of **Dick Smith,** who was transferred to the Ardmore, Okla., district to work in the land department.


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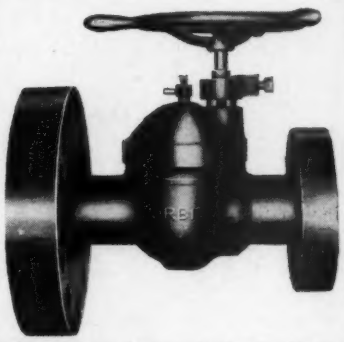
UNEQUAL FLANGES

The ORBIT GEAR OPERATED MASTER VALVE makes your Christmas Tree more compact by eliminating the use of an adapter flange—also eliminating chances for additional gasket leaks. The Unequal Flanges are cast integral with the body of the Valve.



*Orbit Gear Operated Master Valve*

This valve can be furnished thru all fabricators of Xmas Trees or thru any of your local supply stores at a price comparable to that of leading plug valves, YET, this valve requires no lubrication to effect a seal.

See Pages 2194 to 2111 in 1944 Composite Catalog

Specify

ORBIT VALVES

OIL WELL IMPROVEMENTS CO.

Since 1912

TULSA, OKLAHOMA

THE G-FIN STORAGE TANK OIL HEATER
These units can be furnished for installation either inside or outside of the storage tank.

# Why Heavy Oil Flows Freely From These Storage Tanks

**LEAST PRESSURE DROP** . . . because the liquid to be heated passes without change in direction along the straight channels provided by the longitudinal G-FINS of the heating elements, with maximum free area for flow of oil through the heater. This is one of the 10 major superiorities of the G-Fin Storage Tank Oil Heater described in Bulletin 1641 which will be sent on request.

No matter how cold the weather, nor how viscous the oil, a G-FIN Storage Tank Oil Heater assures *speedy* flow of oil, because of the effectiveness of its G-Fin elements, which have 5 times the heat transfer surface of a plain tube or pipe occupying the same cross-sectional area.

Moreover, the flow of oil is dependably *continuous*, because the design of this heater prevents vapor binding or stratification of the hot oil or vapor.

Many thousands of G-Fin Storage Tank Oil Heaters are in use at storage tanks, service tanks, loading wharves or platforms, chemical plants, gas plants . . . wherever fuel oil, lubricating oil, crude oil, tar, asphalt, road oil, cottonseed oil, molasses; or other viscous liquids are stored . . . and their rapidly increasing use demonstrates their uniformly successful service.

**THE GRISCOM-RUSSELL CO.**

**285 MADISON AVENUE, NEW YORK 17, N. Y.**

# GRISCOM-RUSSELL

*Pioneers in Heat Transfer Apparatus*

# Many Factors to Consider In Gasoline-Plant Projects

*(Continued from page 67)*

day actually needed. Quite frequently it becomes necessary to vent a part of the gas supply during periods of high hourly production rate, and such conditions must be interpreted into both the investments and operating income.

2. A similar analysis of the compressor requirements—taking into account each year the producing practices of the operators.

3. A similar analysis of oil-circulating requirements—prophesying requirement in advance of each year.

Peak loads of short duration—whether distributed over the hours of the day or due to the stage of depletion must be carefully watched to avoid the installation of equipment that has little productive life.

4. A carefully estimated summary of surplus residue gas that might be available for sales, and a canvas of possible markets for its disposition.

5. A study of markets for 26-70, L.P.G., and prospects for segregation of isobutane.

The decided advantage of conservation of energy and increased oil recovery has been excellently demonstrated time and again by various producers. Within the near future new pressure-maintenance projects—on a relatively large scale—will be instituted, and within a short time practically every new field will be so operated.

By virtue of the nature of their respective businesses, it is inherent that each can contribute substantially to the other in a pressure-maintenance or repressure program. In our example the plant operator has installed an adequate gas-gathering system and 11,400 hp. which are as serviceable to the producer in his injection program as though he owned them. The presence of an engine room with trained men places the plant operator in a position to perform the boosting services more efficiently and safely and at a substantial saving to the producer. It is only natural that producers reinjecting gas into the sand are much more concerned with an even supply of residue, which is reflected in flowing schedules that permit the boosting facilities to stay loaded over the 24-hour period. This one item is quite often the difference between profit and loss to the gasoline manufacturer. Also, if the absorption system can be built on the intermediate or high stage side of the booster, plant distillation equipment can be reduced roughly in proportion to the absorption pressure, this is a substantial saving to the plant in both investment and operating costs, and effects a decided reduction in boiler fuel which is thereby made available to the producer for injection.

Having no voice as to the volumes, location, nor time such an operation is to be carried on, and a relatively minor interest in the profits to be derived, he must depend upon the producers to underwrite his investments in pressure-maintenance equipment, but should in turn be ready to perform such services for a small margin of profit above actual costs and amortization.

## New Natural-Gasoline Plant At Hawkins in Operation

QUITMAN, Tex.—Its present production required for war needs, the new natural-gasoline plant at Hawkins has started operations. Owned jointly by Natural Gasoline Corp., a subsidiary of Warren Petroleum Corp., and Humble Oil & Refining Co., the plant will manufacture various grades of natural gasoline, isopentane, isobutane, normal butane and propane. It will be operated by Natural Gasoline Corp. The output will be marketed by Warren Petroleum.

## PAW Releases Materials Restrictions

WASHINGTON. — The Petroleum Administration for War has relaxed restrictions on the use of certain critical materials for oil-well drilling in Illinois, 15 counties in southwestern Indiana and 15 counties in western Kentucky.

Under the order spacing of wells will be determined by the geological formation to which the well will penetrate rather than the depth in feet to which a well is drilled. The net effect will be to permit a maximum of four wells to a 40-acre tract.

Two of these wells may be drilled below the base of the Aux Vases level into the O'Hara-McClosky formations, but only one of these two wells may penetrate the formation below the McClosky.

Wells in oil pools above the base of the Aux Vases sand level may be drilled on 10-acre spacing. Between the base of the Aux Vases sand level and the base of the Fredonia formation, in which the O'Hara-McClosky oil pools are found, the wells may be located on a 20-acre spacing pattern. If a well goes below the base of the Fredonia formation a 40-acre spacing pattern will prevail.

Wells completed at a depth above the base of the Aux Vases must be at least 500 ft. from all other wells. A well drilled below the base of the Aux Vases must be at least 900 ft. from other wells drilled at the same or greater depths, and at the same time must be at least 500 ft. from all wells above base of Aux Vases.

# MARKET QUOTATIONS

**Prices as of April 25, 1944**

**(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gallon.)**

### REFINERY GASOLINE

| Octane (A.S.T.M.): | 80† | 72-74 |
|---|---|---|
| Mid-Continent* | 6.00-6.25 | 5.750-6.000 |
| Gulf Coast | 6.00-6.50 | ‡5.750-6.250 |
| Northeast Coast | 9.80 | 9.200 |
| California | | 6.255-6.500 |

*Basis Oklahoma Group 3. †1939 C.F.R. (research method.) ‡Unleaded.

### NATURAL GASOLINE

| Grades: | 26-70 | 18-55 |
|---|---|---|
| Oklahoma (Group 3) | 4.750 | 5.700 |
| North Texas | 4.375 | 5.250 |
| North Louisiana | 4.375 | 5.250 |
| California | 4.875 | 5.500 |

### CRUDE OIL STOCKS

(Bureau of Mines Estimate)

| Week ended: | Bbl. of crude* |
|---|---|
| 4-15-44 | [illegible] |
| 4- 8-44 | 234,172,000 |
| 4-17-43 | 241,421,000 |

*Excludes unrefinable stocks in California.

### CRUDE-OIL PRICES

**Representative posted schedules per barrel.**

| | |
|---|---|
| East Texas | $1.25 |
| Conroe | 1.43 |
| Tepetate, Louisiana | 1.18 |
| Illinois basin | 1.37 |
| Pecos County, Texas | .95 |
| Bradford, Pennsylvania | 3.00 |
| Van, Van Zandt County, Texas* | 1.08 |

*No change since 5-21-41.

### GRAVITY SCHEDULES

**Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:**

| Gravity— | Signal Hill, Calif. | Okla-homa, Kansas | Gulf Coast Texas | West Texas* |
|---|---|---|---|---|
| 18-18.9 | $0.80 | .... | .... | |
| 19-19.9 | .84 | .... | $1.06 | $0.70 |
| 20-20.9 | .88 | $0.85 | 1.08 | .72 |
| 21-21.9 | .92 | .87 | 1.10 | .74 |
| 22-22.9 | .96 | .89 | 1.12 | .76 |
| 23-23.9 | 1.00 | .91 | 1.14 | .78 |
| 24-24.9 | 1.03 | .93 | 1.16 | .80 |
| 25-25.9 | 1.07 | .95 | 1.18 | .82 |
| 26-26.9 | 1.11 | .97 | 1.20 | .84 |
| 27-27.9 | 1.15 | .99 | 1.22 | .86 |
| 28-28.9 | 1.18 | 1.01 | 1.24 | .88 |
| 29-29.9 | 1.20 | 1.03 | 1.26 | .90 |
| 30-30.9 | 1.23 | 1.05 | 1.28 | .92 |
| 31-31.9 | .... | 1.07 | 1.30 | .94 |
| 32-32.9 | .... | 1.09 | 1.32 | .96 |
| 33-33.9 | .... | 1.11 | 1.34 | .98 |
| 34-34.9 | .... | 1.13 | 1.36 | 1.00 |
| 35-35.9 | .... | 1.15 | 1.38 | 1.02 |
| 36-36.9 | .... | 1.17 | 1.40 | 1.04 |
| 37-37.9 | .... | 1.19 | 1.42 | 1.06 |
| 38-38.9 | .... | 1.21 | 1.44 | 1.08 |
| 39-39.9 | .... | 1.23 | 1.46 | 1.10 |
| 40 and above | .... | 1.25 | 1.48 | 1.12 |

*Includes Lea County, New Mexico.

### A.P.I. REFINERY REPORT

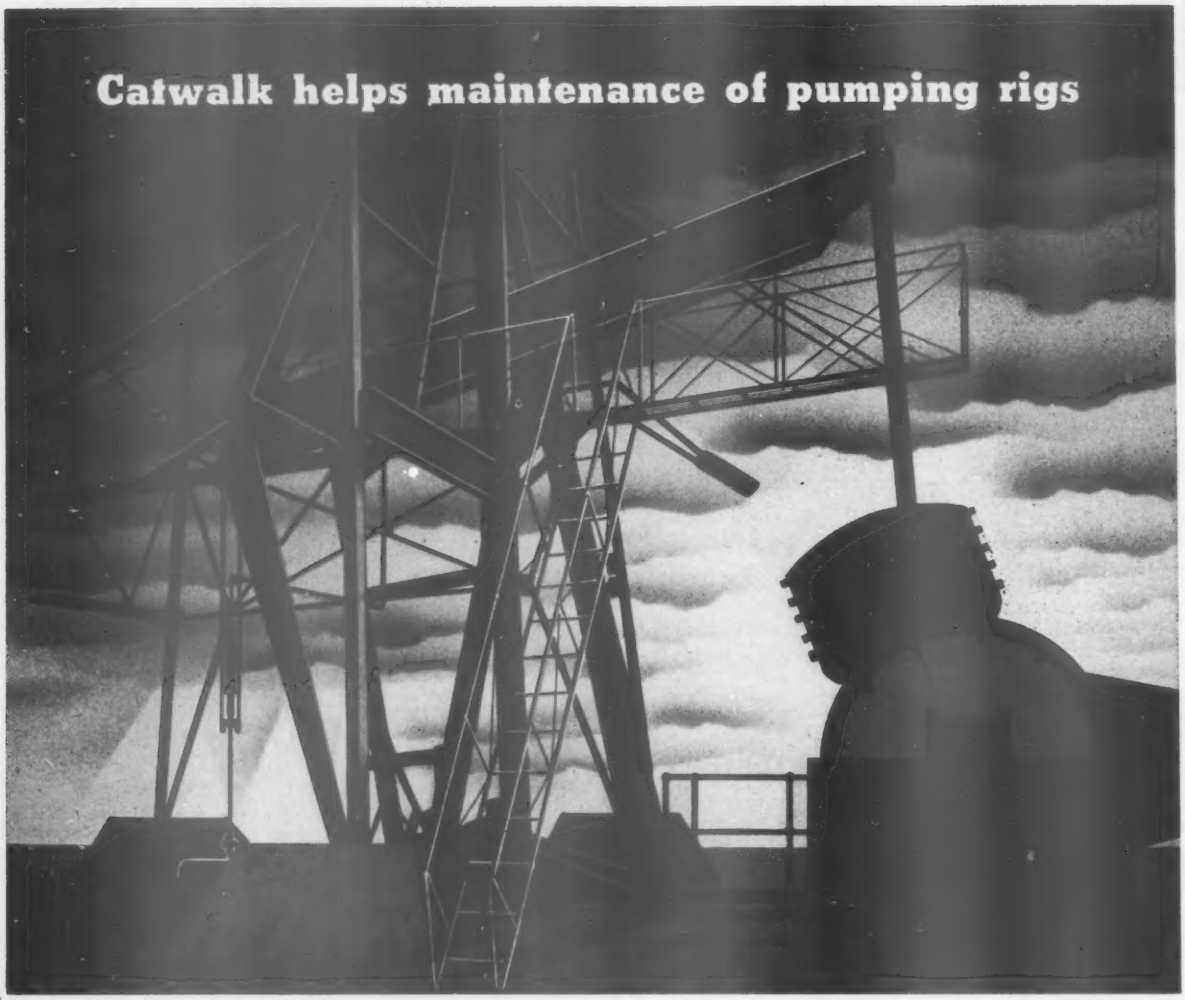
**Week ended April 15, 1944**

**(Figures in thousands of barrels)**

| | Dly. crude runs to stills | Stocks—Gaso-line | Resid-ual | Gas oil |
|---|---|---|---|---|
| Appalachian | 140 | 3,455 | 345 | 1,066 |
| Ind., Ill., Ky. | 734 | 20,348 | 2,681 | 4,966 |
| Okla., Kan., Mo. | 351 | 8,449 | 1,221 | 1,449 |
| Censored area* | 2,323 | 38,796 | 16,269 | 14,796 |
| Rockies | 113 | 2,193 | 551 | 376 |
| California | 786 | †15,537 | 30,191 | 7,908 |
| Total 4-15-44 | 4,447 | 88,778 | 51,238 | 30,561 |
| Total 4- 8-44 | 4,354 | †88,100 | 51,072 | 30,479 |
| Total 4-17-43 | 3,678 | 92,075 | 67,011 | 30,806 |

*Reports combined on East Coast, Texas Gulf Coast, Louisiana-Arkansas and Inland Texas at request of PAW. †Revised.

## Catwalk helps maintenance of pumping rigs



*Information supplied by the "Oil and Gas Journal"*

The inaccessibility of rod hanger assemblies and pitman bearings on pumping rig beams is apt to cause neglect of necessary maintenance operations such as lubrication and adjustments.

The difficulty in one case has been overcome by the installation of a catwalk that makes both ends of the beam readily, and safely, accessible. The catwalk was made of old sucker rods and scrap piping.

It is in two sections, one hinged to permit movement, and the other stationary. The center support is located at the samson post.

The half that extends inside the derrick to the beam head assembly over the well is supported on a pivot hinge at the center point and counterweighted so that it can be raised and held against the back of the derrick when not in use. This gets it out of the way when the well is pumping, or rods or tubing are being pulled.

The stationary section, which extends to the pitman bearings is supported at its outer end by two cables secured to the derrick. There are also two solid bracing arms on the under side to giv further support.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

**Climax Molybdenum Company**

50 Fifth Avenue • New York City

MOLY

# Equipment Progress

## New Fire Extinguisher For Industrial Fires

The new "All-Out" fire extinguisher manufactured by National Powder Extinguisher Corp., 50 Rockefeller

Plaza, New York, is designed especially to extinguish both flammable liquids and fires of electrical origin. The chemical ejects a stream of dry chemical which, when activated by heat, forms a dense, fire-smothering cloud over a flaming area up to 18 ft. The insulating qualities of the cloud help guard against reflash, and create a heat-deflecting screen between the operator and flame, permitting close range attack with greater safety and no heat discomfort. The chemical, a nonconductor of electricity, is harmless to humans and delicate, mechanized parts of motors or machinery.

Weighing only 27 lb. fully charged, the "All-Out" extinguisher is easily maneuvered by men or women workers. It is fast in action and can be quickly recharged at the scene of a fire without special recharging equipment. Both the extinguisher and its extinguishing agent have been tested and approved by the Associated Factory Mutual Laboratories on burning oils, alcohol and gasoline fires.

## Trade Literature

**Yale & Towne Manufacturing Co., Philadelphia Division, Philadelphia 24, Pa.**—"Modern Materials Handling Machinery," a 122-page book that has been prepared to aid industry in making the fullest practical use of this type of equipment. The book is really a useful manual in the art of getting materials from where they are to where they are needed. All types of equipment are discussed, from skids and pallets to the more advanced aids. The volume, which is celluloid-ring bound, is copiously illustrated with line sketches and photographs.

**Brown Fintube Co., Elyria, Ohio.**—A six-page two-color bulletin, No. 432, describing the newly improved Type BFT-1 "Sectional Hairpin" heat exchangers. The bulletin describes the nonremovable rear-end assembly introduced in the exchangers.

**General Electric Co., Schnectady, N. Y.**—Bulletin GEA-4139, a four-page piece which describes the application of low-speed synchronous motors, emphasizing the necessity of providing in the installation the proper amount of flywheel effect to avoid excessive current pulsations. It lists the most important construction features, especially with respect to the rotors and stators, and discusses the synchronization, field removal, and motor protection afforded by the G-E synchronous control.

**Eastman Oil Well Survey Co., Dallas, Tex.**—New catalog which describes and illustrates completely the company's directional drilling and surveying services and equipment.

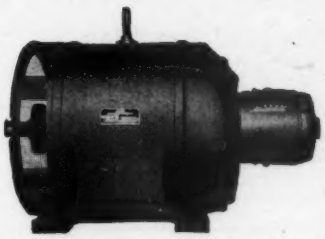
**Jenkins Brothers, 80 White Street, New York 13, N. Y.**—A six-page brochure describing the company's new line of air furnace malleable iron gate, globe, angle and check valves. The valves are recommended for 150-lb. steam pressure at 450° F. where severe service conditions are encountered.

**Macwhyte Co., Kenosha, Wis.**—A pamphlet, entitled Wire Rope Conservation Bulletins. These bulletins are the company's advertisements in leading trade journals, whose purpose is to help users conserve wire rope and to help the nation conserve steel.

**New York Belting & Packing Co., 1 Market Street, Passaic, N. J.**—A booklet entitled "Facts About Synthetic Rubber," a 36-page treatise on the fundamentals of this product. The discussion includes chapters on how chemists make rubber, polymetization, vulcanization, chemical structure, etc.

## Alternating Current Generators for Gas Engine Drive

Century alternating current generators, manufactured by Century Electric Co., 1806 Pine Street, St. Louis, Mo., are available in sizes ½ to 150



kva. for direct connection or belted drives.

This unit shows a revolving field generator arranged to bolt directly to the engine housing and the generator shaft machined to receive a flange that bolts directly to the engine shaft. This generator has one bearing, with the engine end of the shaft supported by the engine bearing. The exciter is mounted on the end of the generator opposite the engine. The exciter shaft is inserted in and keyed to the generator shaft on the inner end and the generator bearing carries the exciter. The exciter has one bearing at the outer end. The generator and the exciter are arranged to use the least space and together with the engine, form a compact power unit.

This generator is described in Bulletin 18-21, page 1.

## LaPlant-Choate Opens New York Office

LaPlant-Choate Manufacturing Co., Cedar Rapids, Iowa, pioneer builders of earth-moving and land-clearing equipment, announces the opening of a sales office in the International Building, Rockefeller Center, New York City. The new office will be in charge of Jay Fetters, formerly London manager of Caterpillar Tractor Co., and more recently on the staff of the Chief of U. S. Army Engineers. Fetters also represented Caterpillar in India, Burma, Afghanistan and Ceylon for 6 years.

## Wailes Dove-Hermiston Corp. Builds New Plant

A new plant is being constructed at Houston, Tex., by Wailes Dove-Hermiston Corp., of Westfield, N. J., to supply the needs for Bitumastic pipe coating in the Southwest. The company will maintain stocks of its various grades of Bitumastic enamels for protection against corrosion of buried pipe lines. The new plant is

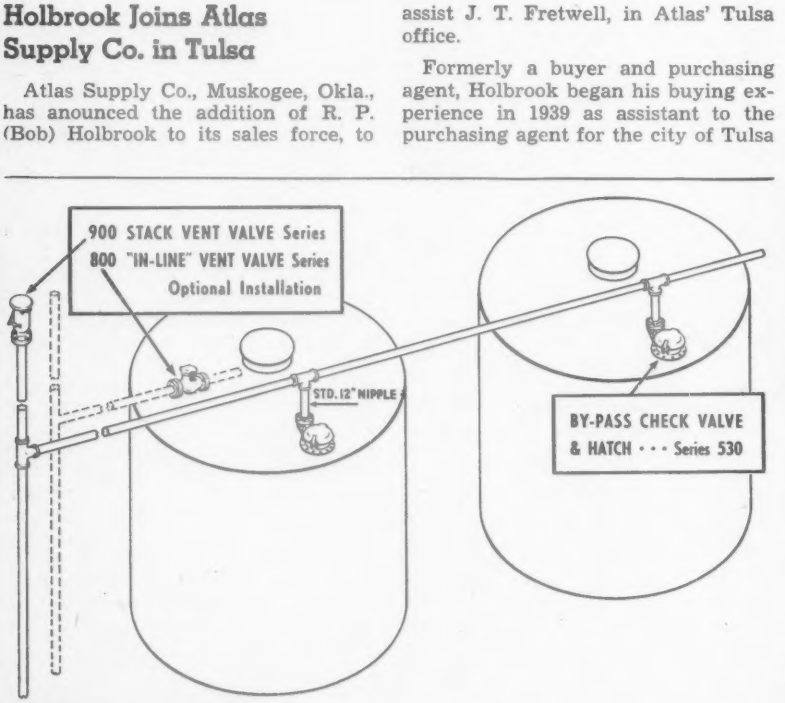
located at 7002 Clinton Drive. A siding of the Houston Belt Terminal Railway serves the property. The plant is of fireproof construction and contains modern manufacturing equipment and a control laboratory. All materials requiring protection against weather will be stored under cover.

# Among Equipment Men

## Holbrook Joins Atlas Supply Co. in Tulsa

Atlas Supply Co., Muskogee, Okla., has anounced the addition of R. P. (Bob) Holbrook to its sales force, to assist J. T. Fretwell, in Atlas' Tulsa office.

Formerly a buyer and purchasing agent, Holbrook began his buying experience in 1939 as assistant to the purchasing agent for the city of Tulsa and was later one of the buyers for E. I. du Pont de Nemours Co., during construction of the powder plant at Pryor, Okla. From that position he went to Borger, Tex., as assistant purchasing agent for Manhattan-Walco Construction Co., while that firm was building the synthetic-rubber plant. He comes to Atlas from Stearns-Roger Manufacturing Co. of Denver, Colo., engineers and contractors on the recently completed helium plant near Great Bend, Kans.



900 STACK VENT VALVE Series
800 "IN-LINE" VENT VALVE Series
Optional Installation
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BY-PASS CHECK VALVE
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FIRST . . . By the conservation of rich condensible vapors in crude oil storage. ENARDO prevents gravity loss and assures you of obtaining full price on your production.

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ENARDO EQUIPMENT on your tankage results in definite savings.

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ENARDO Foundry and Mfg. Co.
TULSA, OKLA.


## Spalding Works Manager Of Springfield Plant

John D. Spalding has been named works manager of the Superior Engine division plant of The National Supply Co. at Springfield, Ohio.

Educated at Carnegie Institute of Technology in mechanical engineering and Duquesne University law school, Spalding joined the National organization as plant engineer at Carnegie, Pa., plant in 1923.

In 1931 he was transferred to the Toledo plant as assistant district engineer and then on to the Torrance, Calif., plant as patent engineer.

In the 13 years of service at Torrance Spalding served as assistant to the vice president from 1935 to 1938 and as works manager from 1938 to his present appointment at the Springfield plant.

## Change of Stock Interests in International Cementers, Inc.

*E. S. DULIN*

Byron Jackson Co. has acquired the interest in International Cementers, Inc., formerly owned by Schlumberger Well Surveying Corp. The interests of Dowell, Inc., and Baker Oil Tools, Inc., remain unchanged. The corporate offices have been moved from Houston, Tex., to Los Angeles, Calif.

E. S. Dulin, of Byron Jackson Co., succeeds E. G. Leonardon, of Schlumberger Well Surveying Corp., as president of International Cementers, Inc. Other officers are J. D. Chesnut, executive vice president; N. R. Crawford, vice president and treasurer; R. Henquet, vice president; C. Penhaligen, auditor; W. H. Wiese, secretary and assistant treasurer. The operating per-

sonnel, with Ward B. Tennis acting as general manager, remain unchanged.

Directors are A. P. Beutel, J. D. Chesnut, N. R. Crawford, E. S. Dulin, Donald Y. Lamont, F. C. Merritt, C. Penhaligen, and T. Sutter.

International Cementers, Inc., will continue its former operations as a leading organization in the cementing and acidizing of oil and gas wells. Cementing units used in domestic fields also are available for sale in the export market.

A recently inaugurated service is general industrial chemical treatment for dissolving and disintegrating water-deposited scales and sludges from all types of heat-exchange equipment.

## Donze Elected Timken Vice President

A. M. Donze, factory manager of Timken Roller Bearing Co., Canton, Ohio, for the past 8 years, has become vice president in charge of production.

At the same time, H. M. Richey, assistant factory manager, was promoted to factory manager.

Donze, a native of Cleveland, Ohio, has been with the Timken company since 1919. In 1921, after several progressive steps, he became production manager of the bearing factory; in 1934 was appointed factory manager; and in 1940 was elected a director of the company.

Richey, a native of Bremen, Ohio, joined the Timken company in 1916, beginning as an assistant foreman. He became assistant factory manager in 1940.

## National Radiator Appoints Holmes Sales Manager

The National Radiator Co., Johnstown, Pa., has announced the appointment of Paul B. Holmes, as manager of sales of the heating division. He succeeds the late Charles L. Crouse.

Holmes has been with the company for 27 years. His first position was in the office of the Washington branch. Later he became a salesman in this territory, and was promoted to branch manager in 1935.

During the period of 1939-1941, he supervised the operation of the Washington and Richmond offices. Special assignments in Washington in connection with war orders and priorities, made it necessary for him to relinquish supervision of the Richmond office. He later became the liaison representative between the company and government agencies.

## New Elliott Company Official

C. A. BERCAW

Appointment of Corliss A. Bercaw as assistant general manager of Elliott Co.'s Springfield, Ohio, division, is announced by G. L. Elliott, general manager. The company makes tube cleaners for industrial, marine and locomotive boilers and for tubular apparatus used by chemurgic, refining and processing industries.

Bercaw, former Baldwin Locomotive and Westinghouse executive, was born in Holgate, Ohio, and received his bachelor of science degree in mechanical engineering at California Institute of Technology.

A naval ensign and aviator in World War I, he joined Westinghouse after his discharge from service, as an engineer, and became special representative of the diesel engine division. He was associated with the Baldwin Locomotive Works as sales manager of diesel locomotives and later production manager of the diesel engine division before joining Elliott Co.


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Extra tire mileage means a lot to heavy-duty motor carriers these days. It's our job at McDermott's to prolong the life of your vital tires. We specialize in recapping and repairing ALL sizes of tires—from passenger cars to swamp-buggies!

NEW TRUCK TIRES—ALL SIZES!

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## Meter Company Elects New Officials

At the annual meeting of Pittsburgh Equitable Meter Co., Col. Willard F. Rockwell was elected chairman of the board. Colonel Rockwell,

E. W. MEYERS

W. S. POTTER

who has been president of the company since 1926, will continue as active head of the firm and serve in the dual capacity of president and board chairman.

Subsequently announced were the elections of Edgar W. Meyers as director and William S. Potter as vice president.

Meyers, treasurer for the past 18 years, will continue to serve in that position.

Potter formerly was assistant works manager. He has been connected with the Pittsburgh concern for the past 14 years in various engineering and production capacities.

## Grease Remover Developed By Kelite Products

A fast-working remover of heavy grease and crude-oil deposits has been developed by Kelite Products, Inc., 909 East Sixtieth Street, Los Angeles, for oil-field use. It is used most successfully in a mixture with kerosene, being sprayed on the rig before steam cleaning.

A powerful "wetting out" agent and a controlled pH, which is high enough for effective cleaning action but not too high for easy rinsing are important features of the new material. It is known as Kelite Pro-Star.

## Creagh Named Ad Head of American Chain & Cable

Edward V. Creagh has been appointed advertising and sales promotion manager of American Chain & Cable Co., Inc., and associate companies, Bridgeport, Conn.

Mr. Creagh joined the company in 1916. He has been in charge of sales promotion activities since 1936. His new duties will cover newspaper, magazine, business publications, and other forms of advertising, in addition to sales promotion.

One of the organizers and first president of the Western New England chapter of National Industrial Advertisers Association, Creagh is now serving as a vice president of the national organization.

## McKee Names Elder As Engineering Executive

Arthur G. McKee & Co., Cleveland, designing and construction engineers in the petroleum refinery and iron and steel industries, announce the appointment of Thomas G. Elder as an engineering executive in their petroleum refining division.

Elder comes to the McKee company with more than 25 years of continuous experience in petroleum refining operations. During the past 3 years, he was superintendent of manufacturing for National Refining Co. in which position, besides directing all manufacturing operations, he also handled the building of new aviation gasoline plant facilities for National in Coffeyville, Kans. During the war period, he has been active in the petroleum refining war program, having been a member of the Petroleum Industry War Council subcommittee on postwar adjustments and a member of the American Petroleum Institute on the protection of petroleum facilities.

Prior to joining National Refining Co., Elder served Shell Oil Co., Inc., for nearly 23 years holding various operating and executive positions, including those as manager of Shell's East Chicago, Ind., refinery, and as assistant superintendent and superintendent of both its Houston and Wood River refineries.

## Marley Co. Announces Personnel Shifts

WALTER S. SMITH

The Marley Co., Inc., cooling-tower manufacturers with main offices in Kansas City, Kans., announce personnel shifts resulting from raising their Houston office to the status of a divisional headquarters under the direction of Ray T. Jenkins, who formerly headed the Tulsa division.

The company is now represented in the Tulsa area (all of Oklahoma, western Arkansas and the Texas Panhandle) by Walter S. Smith and his Process Equipment Co., 306 Tulsa Building. Smith, a resident of Tulsa for more than 6 years, is well-known throughout the territory as an applications engineer for heat-transfer equipment.

From the main office, Joe T. McKinley has joined the Houston staff. The Kansas and western Missouri area is now handled by R. H. Ahrens out of the company's headquarters.

## Ohio Steel Foundry Co. Enlarging Springfield Facilities

Announcement is made by the Springfield plant of Ohio Steel Foundry Co. of greatly increased manufacturing facilities.

The work includes an enlargement and reorganization of the foundry, new chemical and physical laboratories, much new equipment throughout the plant and an enlarged office building.

Much new machinery has been installed in the foundry. New and better methods have been worked out for obtaining greater tonnage. Although these facilities give the big foundry an over-all increase in castings of all kinds, it has added greatest capacity to return bends.


# Classified Advertising

### OIL REPORTS

OIL REPORTS
SOUTH GEORGIA
6 month sub. $6.00
C. W. Deming—Publisher
Waycross, Georgia
20 years operating out of Tulsa

### FINANCING

CAPITAL SEEKERS — Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit 1, Mich.

CAPITAL inexpensively raised. Write for our proposition today. No charge for consultation. Postcards ignored. Address: Service P.O. Box 165, Chicago 90, Ill.

### WANTED

WANTED: Sales rights for outstanding oil field items. Splendid Okla. City location on trackage. Box C-295, The Oil and Gas Journal, Tulsa, Okla.

WANTED

GOVERNOR SIDE FLYWHEEL FOR 16 X 16 FRANKLIN VALVELESS ENGINE

CENTRAL COMMERCIAL CO.
P. O. BOX 2306, TULSA 1, OKLA.

REPRESENTATIVES AVAILABLE

Additional lines wanted for New York City and Texas Gulf Coast areas by firm with sales force contacting oil, chemical and power engineers and purchasing agents. Interested in any machinery or materials used by these industries. Reply to Houston Pipe & Steel Co., Room 2606, 420 Lexington Ave., New York 17, N. Y.